FOOD INDUSTRIES

APRIL 1939

HOMES OF FAMOUS FOODS... BEECH-NUT PRODUCTS, CANAJOHARIE, N. Y.

IN THIS ISSUE: From Batch to Continuous Process

How to Save Steam and Power

McGRAW-HILL PUBLISHING COMPANY, INC.

A Better Mix from a Better Mixer

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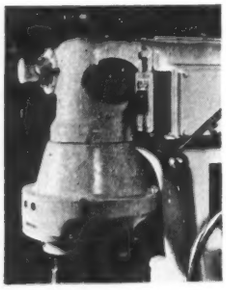

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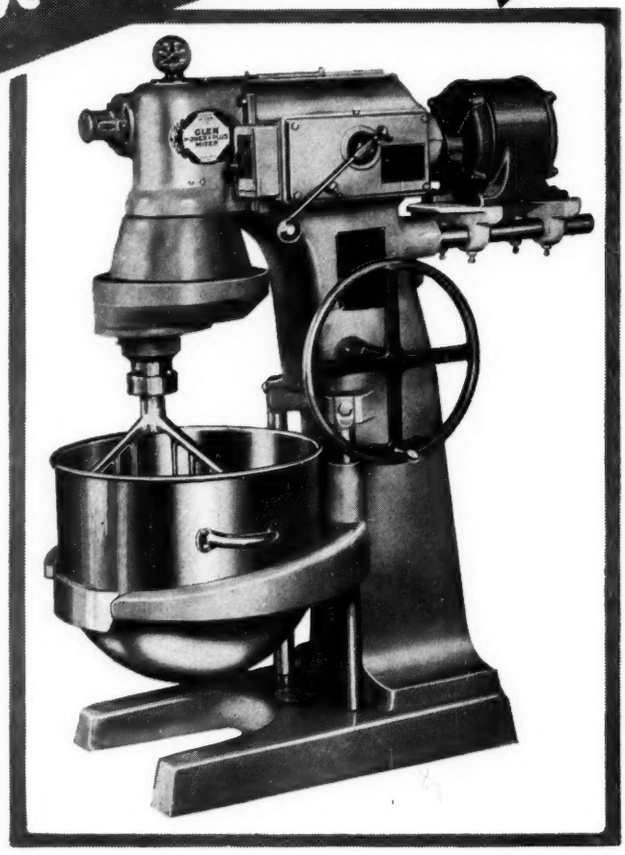

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Contents for APRIL 1939

VOLUME II • NUMBER 4

FOOD TECHNOLOGY

New Discoveries and Invention

Food Technology
Foods and Technology of Tomorrow..... 215

Bakery Products
Vitamin Enrichment in Flour..... 215
What Happens to Sugar in Bread..... 215

Beverages
Three Ways for Brewers to Avoid Stream Pollution 215
Reason for Keeping Beer in Darkness..... 216

Canned Foods
Molded Plastic Cans—Not Yet..... 216
Flash Pasteurized Apple Juice..... 216

Fermented Foods
Causes of Pink Sauerkraut..... 216

Dairy Products
Quick Test for Size of Water Droplets in Butter 216
Preserving Cream or Butter..... 237

Meats and Fish
"Stick" Is Not So Hot in Diet for Pullets.. 237
Preserving Light Smoked Fish..... 237
Storage Temperature and Freezing Rate for Halibut 238

Margarine
Margarine Spoilage 238

Sugar
Ash Content and Color of Sugar..... 239

Miscellaneous
Keeping Qualities of Coffee Substitutes..... 239
Cause of Blackened Boiled Potatoes..... 239
Sugarless Beverages 240
New Trick in Rapid Moisture Determination. 240

★HOMES OF FAMOUS FOODS

Food Industries' cover this month shows a sunlit autumn view of the plant in Canajoharie, N. Y., one of several sites where Beech-Nut Packing Co., prepares its world-famous line of fine foods.

THIS MONTH

Mistakes To Avoid in Packaging — Part II 206

Food Producer Can Supply Consumer Needs 187
A Public Relations Feature—*By E. G. Montgomery*

PROCESSING

Automatic Machine Fillets Fish.....*By Harden F. Taylor* 189

Converting Batch Operation to Continuous Process..... 190
By G. T. Reich

There's More to Sugar Refining Costs... *Says E. E. Chapin* 193

Engineering Analysis Shows Conditions Affecting Capacity 196
By A. W. Farrall

What to Do to Prevent Spoilage by Contamination..... 198
By J. E. Hanaché

The Truth About Frozen Bread—Part II..... 200
By W. H. Cathcart

These Food Plants Cut Operating Costs—Part I..... 202
By C. R. Earle

Here Are Ways to Wash Bottles Clean..... 205
By C. R. Arnold and M. Levine

DISTRIBUTION

Food Packages Win Awards..... 208

Merchandising Hints and Hurdles..... 211

Motor Vehicles Used to Improve Public Relations..... 214

EVERY MONTH

Talk of the Industry.... 183
Automotive Section..... 214
The Plant Notebook.... 217
Food Equipment News.. 218
Catalogs 220
The Food Industry News 221
Business Trends..... 225
Men, Jobs and Companies 227
Book Notes..... 241
Patents 242

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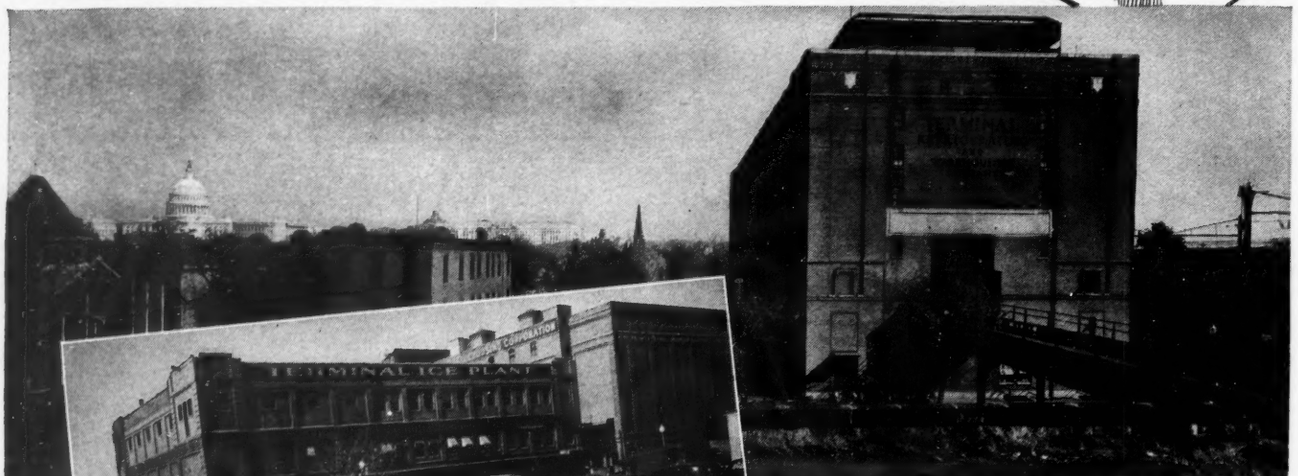
Washington, D. C. Refrigeration Plants

PUT TROUBLE ON ICE



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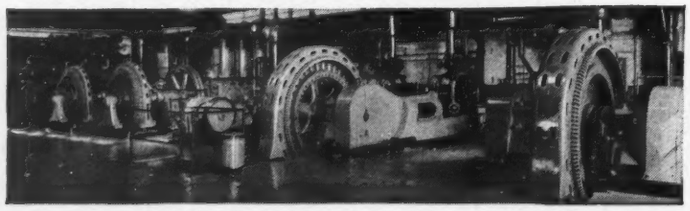

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LAURENCE V. BURTON, Editor

Volume 11, Number 4 April 1939

The Talk of the Industry

» A NEW TERM—"Home maker"—is creeping into the American language. We feel very acutely conscious about it, for after commenting on the testimony of a "housewife" at a food standard hearing, we were roundly chided for being behind the times. The correct word is "home maker." And, if you must know, a home maker includes the gal who is not married, has a job, and keeps house alone in a phlatt or an apahtment.

One such home maker objected to $NaHCO_3$ (sodium bicarbonate to you) in foods because she was "agin" all chemical preservatives. Which goes to show that home makers is good gals.

» SPEAKING of rotten public relations, the federal income tax bureau has taken a step backward and is now in the same class with certain states which impose an income tax. There is no surer way to arouse the taxpayer's ire than to present two alternative methods of computing one's income tax and then require the victim to pay the *larger* of the two tax liabilities.

Around March 12, anyone who wrestles with the increasing complexities of personal income taxes is ready to commit mayhem with a dull wooden knife on any representative of the Treasury Department. Those birds must stay up nights figuring out ways to make taxpayers ugly.

» FUNDAMENTAL TRENDS in manufacturing industry are indicated without comment by the studies of the National Industrial Conference Board. Comparisons, based on 1929 as 100, show that by December, 1938, the national output per man-hour stood at 124, while the labor cost per $100 of output was 113. Yet the labor cost per man-hour was only 96, and the number of man-hours per unit of output had dropped to 80.

Fine. In fact, splendid. Furthermore, what is known as "real" weekly earnings of employees was up to 106. It sounds rosy. It would be rosy except for the incontrovertible fact that those on relief and those who are unemployed do not share the foregoing social-economic-industrial progress.

» AFTER READING the scientific paper by Carl S. Pederson and C. D. Kelly on the Development of Pink Color in Sauerkraut (Food Research **3**, 583, 1938,) the idea has come to us that a study of the possible use of carbon dioxide in the fermentation of sauerkraut is worth consideration. Our idea would be to inject a little gaseous carbon dioxide into the bottom of a mass of fermenting sauerkraut after two or three days time.

The purpose would be to replace entrapped air with carbon dioxide after the secondary fermentation begins, for the purpose of securing better control over quality of the finished kraut.

» Now that the Packaging Conference has come and gone, with its session on labeling and packaging under the new Food, Drug, and Cosmetic Act, one observation stands out preeminently.

Every manufacturer who is required to list his ingredients on his labels somehow just can't quite make up his mind to do it. The general attitude is something akin to the shivering reluctance of a person who is about to plunge into a cold lake—putting it off by every pretext as long as possible.

June 25 is not very far away, not over eleven weeks from the time you read this. Despite this close proximity we have learned of recent huge orders for old style labels by concerns doing interstate business. Orders running into several millions of labels. A year's supply, and nary a mention of an ingredient. Some fun, eh boss?

Every week FOOD INDUSTRIES re-

ceives a flock of letters asking if we have heard of the new law? What are we doing about it? Where can one get a copy of it? Please tell us what we are required to do? When does it become effective? What can we do to prevent its enactment? etc., until one wonders where these people have been since 1933.

In case you don't know what the new law requires, get a copy of it from the Food and Drug Administration, U. S. Department of Agriculture, Washington, D. C. Ask also for the Regulations.

And make up your mind that you have got to comply, distasteful though it may be.

Problems of Surplus Commodities

STAMP BOOTLEGGING is the latest answer of the Department of Agriculture to attacks on its "Doctrine of Scarcity." Not that anyone in the Administration admits the title "stamp bootlegging" is accurate, but, oh boy, wait until the snoopers begin to report!

In brief, the scheme is an effort to dispose of surplus agricultural products by actually having the surpluses consumed, and consumed by needy persons, instead of relying solely on the six-year old policy of paying the farmers not to raise crops which are badly needed. It would work like this: The government would give every reliefer, of whatever status, 50 per cent more than he is now supposed to be spending for food. If he spends $20 a month for his family's food, he would get an additional $10. This extra ten bucks would be in blue stamps. Instead of the $20 a month he is now supposed to be spending for food, but which he now gets in cash, he would get $20 par value of orange stamps.

The orange stamps he could spend for any food he wanted. The blue stamps he can spend only for foods which have been officially classified as in the surplus class.

The honest grocer will take the stamps, being careful to give only surplus foods for the blue ones, turn in all the stamps to the government and get par for them. Thus the government will be paying retail prices for the surplus foods instead of buying them wholesale as at present. But, it is argued, there will be less disruption of business this way.

One of the arguments said to have prevailed in getting this stamp plan (no one is claiming paternity for it, and of course under the more accurate word "scrip" it is not a new idea) is that everyone will be for it except the taxpayers, and they are not vocal. Careful estimates indicate it will cost the Treasury over half a billion dollars more than present relief plus the 70 odd millions a year now spent for foods to be distributed!

But everyone except the government —and the taxpayers—will profit. The reliefers will get more food, though some of them may object to the orange stamps. At present they can spend this money for chewing gum or gin, if they prefer them to food. But the blue stamps will be velvet. The grocers, presumably, will make a profit because they can sell more food and are not restricted by any governmental action as to profits. The farmers ought to like it, because it would certainly move part of the surpluses.

The only question is whether the government has a right to place such a temptation in the path of the grocers, meaning the bootleg opportunity for handing over articles on which there is more profit. For instance, gin. Or buying in the blue coupons, which will come in 25-cent denominations only, at 20 cents or even 15 cents each is easily possible, if their surplus sales to cash customers warrant it. It seems to be flying straight in the face of the Biblical injunction about protecting the straying brother!

Hors d'Oeuvres

• Here's a new trick in public relations. There is a truck owner who misspells one or two words on each side of his vehicles. This, the man believes, attracts attention and brings in many postal cards, letters and telephone calls from people who are impressed by the error and think the sign painter made a mistake which the owner did not notice. But if you employ this device you take your chances as to whom your public will think is dumb.

• *Concentrated food in capsule form is on sale at the California World's Fair. This type of food might be practical if compressed air were put into the capsule to keep the sides of your empty stomach from rubbing together.*

• We have at hand a highly magnified picture of vitamin B. It looks like several bunches of short crisscrossed straws with jagged ends. It has long been a mystery as to just how vitamins do what they do in the biological processes. Perhaps they just tickle the gizzard, or liver or something and stimulate activity.

• *Yarn made from soybeans is being used experimentally in the manufacture of textiles. And a process recently was developed to make wool from milk. If this keeps up, the food industries soon will be clothing the nation.*

• During the past two years National Biscuit Co. conducted 1,887 experiments, an average of a little over 3½ a day. Apparently the creation of popular products like the Ritz cracker is not just a happy accident.

• *Twenty calves will be exhibited by Borden Co. in connection with its display at the New York World's Fair. These will be replaced every three weeks to assure calves of a cute age. Such are the intricacies of effective public relations.*

• A canner recently argued that federal seizure of some of his tomato paste was unwarranted because the worm fragments contained in it were not "perceptible" to the consumer. No doubt the consumers were glad that the worms were in such a highly processed state.

• *It has been reported, without too much authority, that compositions of Beethoven have a soothing effect on cows. So it looks as if there may be two ways by which to make cows contented.*

• Have you heard the latest one about the traveling salesman and the farmer's daughter? We wouldn't dare print it in English. Can you read French? Si vous traduisez ceci, vous êtes un fou d'Avril!

• *Charles R. Hook, president of American Rolling Mill Co. and chairman of National Association of Manufacturers, remarked in a recent radio talk that "if we could strip away the mystery, we would find that running a business is a great deal like running a home." Which may explain why so many businessmen go broke.*

—F.K.L.

Wagner Act Clarification

EMPLOYERS regained many rights under the Supreme Court Decision on Feb. 27 in the Fansteel, Columbian Enameling and Sands Manufacturing cases. These rights had been assumed to be non-existent by the National Labor Relations Board's interpretation of the Wagner Act. Collective bargaining is still the law, but it is not to be one sided bargaining any more. Employers are not wholly the goats any longer.

One is a bit surprised that J. War-

ren Madden, Chairman of the NLRB, who was once head of a law school, would have made so unsustainable an interpretation of the law as he utilized for guiding the board's activities.

Under the Supreme Court rulings, the board cannot compel reinstatement of employees discharged for illegal acts, an employee may be discharged for repudiation of his agreement, and after a breach of contract by a union the employer may sign a contract with another representative union.

New State Food Laws

ACCORDING to all available reports there will soon be a number of new state food laws with which the food manufacturer must also comply, in addition to the new federal statute.

Indiana is the first state to take action, but in many other states there are bills to revise entirely the existing food laws.

If the principles embodied in the new Indiana statute are followed by other states, it will be fortunate for the entire industry; for Indiana follows the plan of permitting the federal statute to rule in the case of interstate shipments. On intrastate production and shipment the state statute will govern.

Greatly needed at the present time are state laws that conform to the federal act. But many states are endeavoring to embody some of their own private ideas that are not in such conformity. It is to be hoped that sanity and uniformity will prevail.

Monopoly in Foods?

WE SEE by the papers that Dr. Fredric C. Howe is in again. This time the late consumers counsel of AAA testified before the Temporary National Economic Committee to the effect that Borden and National Dairy Products are monopolies and fix the prices paid by all customers and to all farmers for fluid milk for the whole United States.

Several years ago—about 1934—Dr. Howe told this department that he believed pasteurization was merely a pious camouflage, foisted on the public by dairies to make it appear that the processing of milk was an inordinately costly operation; that pasteurization of milk was a needless cost which should be eliminated; that there was no evidence that typhoid fever was prevented by pasteurization, *et cetera*.

He was somewhat surprised to learn that pasteurization of milk is required by law for the purpose of preventing bovine type of tuberculosis in humans.

This is the same man who once observed with alarm that the indexes of retail food prices and wages always go up and down in parallel. This parallelism, he seemed to think, indicated something unholy, somewhere or somehow.

FOOD INDUSTRIES believes that such parallelism is the normal behavior, that any divergence between food prices and wages would be strange news indeed. If the mere business of living did not cost nearly all that most of us could earn, there would be very few of us who would work so hard, if at all.

It is not our intention to defend monopolistic practices that are distasteful or contrary to public welfare. On the other hand, we believe that somebody has to translate public buying power into definite prices to farmers, prices to customers, and to provide the necessary distribution facilities if business is to be orderly instead of chaotic. That somebody is usually the head of a big corporation. Dr. Howe may be right or he may be wrong. In view of some of his previously expressed opinions based on somewhat less than all the facts, we believe that there is much more to be learned than the trifle he has presented.

Take the Tax from Alcohol

DEFAULT DECREES for seized foods containing diethyleneglycol continue to clutter up the pages of Notices of Judgment where the Food and Drug Administration reports the outcome of its actions.

If Congress would lower the outrageous taxes imposed on pure ethyl alcohol for manufacturing purposes, there would be little incentive to manufacturers of flavoring materials to seek for tax-free solvents of synthetic origin and little known physiological action.

Taxes on alcohol and sugar are about as stupid in origin as anything imaginable. A totalitarian state could hardly be expected to do worse.

Illegal Sit Downs and Public Relations Policies

HOWEVER GREAT the temptation, or however justifiable the decision may be, it is not a sound public relations policy to discharge employees immediately because a recent Supreme Court ruling determines that they had no right under the law to stage a sit-down.

In many instances, admittedly, there are circumstances that will try the patience of a saint, let alone a factory superintendent. If the situation is so bad that it needs a house cleaning, let it be done with deliberation. But when a situation gets as bad as this, perhaps management and supervisory employees may indulge in a bit of critical self appraisal with profit to themselves and the entire personnel.

Human beings are as responsive to kindliness and dignified treatment and genuine interest in them as a cat or a dog to a gentle patting on the back. But the policy must be consistent, not cold today and hot tomorrow.

What Was All the Shooting For?

SOME NINE MONTHS have elapsed after enactment of the new food and drug law. Public hearings on standards of identity have been held so far on only tomato products and egg products. The Secretary of Agriculture has now found it necessary to put off for two whole years the promulgation of standards of identity of a considerable list of foods—24 to be exact.

Apparently it's going to be years before all foods are identified in legal terms. With this thought before us, what length of time would have elasped before quality grades could have been announced—let alone enforced—had Congress included that requirement also?

It begins to appear that the opponents of quality grading could have saved their energy and died peaceably at the end of their respective careers if anyone could have foreseen the huge task ahead.

No More "Sucker Money"

A REAL CLOSE-UP PICTURE of why private capital does not do all the things that President Roosevelt says it should do before he can stop government spending came before us not long ago. Our opinion, believe it or not, was sought by an investment house which had been approached for a sum that ran into seven figures. The discussion ran for three hours and wound up as follows (the banker was speaking):

"Obviously this is no investment for public money. The only out for them is 'sucker money.' But there isn't any 'sucker money' any more. None of my generation, in this house, has been able to accumulate a personal working capital of more than twenty-five to

fifty grand. In the old days, we'd have been the suckers and if we lost our stake we could have made another in a reasonable time. But if I were to go broke today and had to start over, I'd be an old man before I got back to where I am right now.

"Furthermore, in the old days, at my age a fellow would have had a working capital of a hundred to three hundred thousand. If a proposition like this appeared to have a better than even chance, a bunch of us would have put up the money out of our own pockets. But a new enterprise which needs more than a million of 'sucker money' has a slim chance. The promoter can tramp the 'Street' from one end to the other and never find it."

"Isn't there any private capital left?" he was asked.

"Oh yes, our senior partner, who is well along in years, could do it out of his own funds; but why should he? At best he has only a few more years to live and the last nine years have been an awful strain. If he should go in on a sucker deal like this and make a good thing of it, the government gets half—while if it flops, it is one hundred per cent his loss.

"As soon as the older generation dies and my generation becomes the senior partners, there will not be any sucker money at all. We can't accumulate it and theirs' will go for inheritance taxes.

"The growth of business in the future will be a vastly different affair than in the past. I doubt if there will ever again be any sizeable amounts of capital in private hands—capital that will take a real business risk. We have got to be content to grub along on a safe investment basis."

W. D. Bigelow

ONE who contemplates the true place that was occupied by the late W. D. Bigelow in the American food industry must come to the conclusion that he was one of the earliest of the pioneer food technologists.

As a result of his stimulus, the heat sterilization of canned foods has been studied by research workers until it is now an exact science.

Under his direction, the research laboratories of the National Canners Association have grown through the years from 1913 to a large size and an exceptionally high scientific standing. Though the researches carried on by the association were for industrial purposes, the quality of its scientific work has been comparable to that of a first class university.

The attainments of the organization which he directed are a standard of excellence for all association and cooperative research institutions. It would be difficult, indeed, to visualize an association research laboratory that would excel it.

Such an institution is the fruition of the life work of a gentle, generous and humble man.

Beer and Jelly—Much Alike

WHAT has jelly to do with beer? Well, at first blush you might say, "Absolutely nothing." If anybody had asked us that question prior to 1939, our reply would have been just that. And it would have been half wrong. The raw materials for making jelly and beer are quite dissimilar. On the other hand, the methods—the unit operations and unit processes—are strangely alike.

To make jelly, you cook, evaporate and hydrolyze. To make a brewing of wort, you hydrolyze, cook and evaporate. The sequence is different, the extent to which they are carried out is different, and the hydrolytic agent is different. But *the methods are the same!*

While Doctor Reich's new jelly machine (see page 190) is a revolutionary development in jelly making, there is reason to believe that the principles he has worked out will apply equally well to the production of beer wort in a continuous operation.

It would be foolhardy to say that his new way of making jelly could be applied with ease to beer. It took a year-and-a-half to apply it to a single jelly plant where it is now working to perfection.

To apply his methods to brewing might take five years, even ten years of arduous work. The expected difficulties to be encountered notwithstanding, there are rewards of economy, of quality control and of quality improvement that are a challenge. When you read his article, forget the raw materials and study the unit operations and unit processes. Beer wort and jelly have little in common except the methods that are employed in their production. But making jelly and beer are much alike in this respect.

Progress in Malt Improvement

MALT is a food ingredient having increasing use in the food industries, as well as other industrial uses e.g. textiles and distilling. Its principal function is to provide an economic and palatable source of enzymes, diastatic and proteolytic. In the food industries it is used both as malt itself or as malt extract in the production of beer, bread, malted milk, malt sugar, yeast and malt vinegar.

To produce malt, barley is sprouted, dried and milled. Barley is a grain of variable characteristics and there are many varieties of barley, the properties of which can be varied and improved by selection, breeding and hybridization. Work of this character has been going on for some time at the University of Wisconsin under the sponsorship of the U. S. Maltsters Association.

Recognizing that the time has arrived for cooperation between the users of malt and the breeding experimenters to decide on what characteristics to increase and what to suppress in the barley, a call has been sent out for a meeting of malt users on April 14, Hotel Bismarck, Chicago. Communications should be sent to Prof. J. G. Dickson, Agronomy Building, University of Wisconsin, Madison, Wis.

A Triumph of Food Engineering

THE WORK done by Dr. G. T. Reich in the conversion of an age-old batch operation to a continuous process, described on page 190, is a corking good example of food engineering at its best. In the same category is the method of cooking tapioca developed by Minute Tapioca Co., at Orange, Mass., now a part of General Foods Corp. (See FOOD INDUSTRIES, 1, 491, August, 1929).

Let those manufacturers, who might wonder what to do with a food technologist or food engineer, consider what an advantage it would be to achieve a parallel success in their own businesses.

Doctor Reich is a sugar technologist and a chemical engineer, trained and experienced in the methods of the process industries. When a man of his training and methods of thought tackles a problem, it often yields something worth while as in this instance.

His development would, however, have been impossible had not Messrs. Daniel Conway and John Kessler of Minot Food Packers, Inc., been alert and intelligent enough to grasp a real opportunity when it was offered. To them should go an equal amount of praise.

Progress in food technology depends as much on intelligent management as it does on intelligent and qualified food technologists and engineers. It is greatest when you have a combination of both.

American Food Producers Can Supply All Consumer Needs

Many nations have been forced to restrict diet because of scarcity of tillable soil. In contrast, U. S. farmers raise ample crops so that food manufacturers can supply consumers with any desired diet.

By E. G. MONTGOMERY
Chevy Chase, Md.

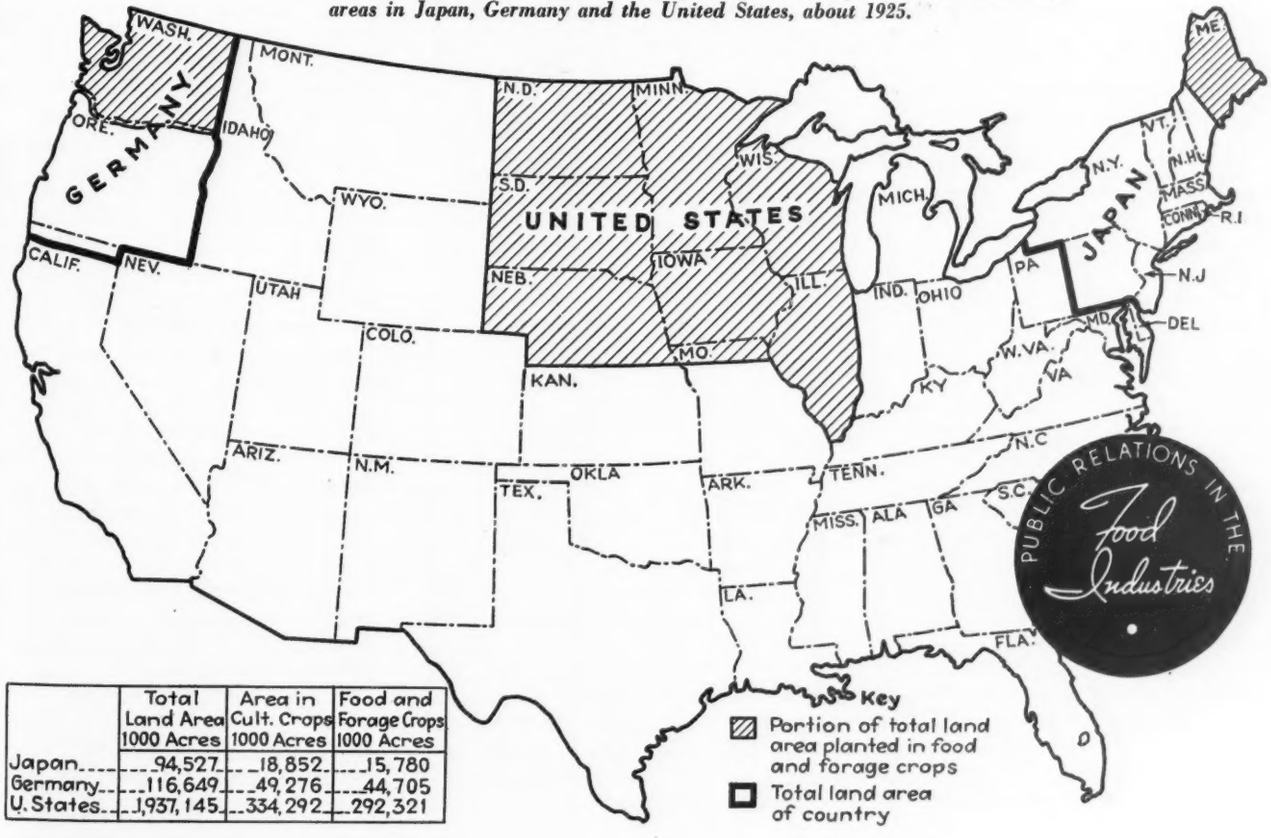
NO OTHER PEOPLE in the world are in a more fortunate situation as to food supplies than the American public. Consumers in this country can pick and choose among a great variety of fresh and manufactured food products. Their opportunity to achieve an appetizing and balanced diet is unlimited by any restrictions, so far as the American farmer and food manufacturer are concerned. These facts are sharply focussed by the data in this article, which compares the situation in this country to that in other industrial world powers.

ECONOMIC PRESSURE and scarcity of land resources have changed food habits in many parts of the world. But the American people of today eat about what they like. The diet in this country has changed, but for most people it has been through choice and not of necessity. Occupational changes and better knowledge of the relation between diet and health have caused changes in the per capita consumption of some foods. However, the total food consumed per capita has changed but little, as shown in the table. What changes have occurred have been within the total.

Land resources in the United States are so great that all kinds of food are available and within reach of the purchasing power of most consumers. Much has been said about the importance of soil conservation to assure the food supplies of future generations. But, until the population is much larger, or erosion and soil depletion have made tremendously greater strides, changes in the American diet because of an arable land scarcity will be unnecessary.

In older countries, with smaller land resources, food consumption has long been adapted to what the land could produce. Some of these adapta-

Acreage devoted to food and forage crops as compared with total land areas in Japan, Germany and the United States, about 1925.



	Total Land Area 1000 Acres	Area in Cult. Crops 1000 Acres	Food and Forage Crops 1000 Acres
Japan	94,527	18,852	15,780
Germany	116,649	49,276	44,705
U. States	1,937,145	334,292	292,321

PUBLIC RELATIONS IN THE Food Industries

Average per Capita Consumption of Principal Food Products, 1920–37[1]

(Pounds per capita per year)

Commodity or group	*1920–24*	*1925–29*	*1930–33*	*1934–37*	*1920–37*
Cereal products	229	226	211	196	217
All potatoes	178	164	156	157	164
Sugar and sirup.....	106	118	107	110	110
Dairy products:[2]					
Milk and cream[3].....	315	324	337	328	328
Manufactured[4]	48	45	46	49	45
Butter[5]	16.8	17.5	17.9	17.2	17.3
Fruits:					
Fresh	179	192	184	189	186
Dried	6	6	5	6	6
Vegetables	135	148	154	169	151
Lean meats and fish.....	138	133	129	126	132
Eggs	28	32	32	30	30
Beans, peas, nuts.....	11	14	16	16	14
Fats (excluding butter)..	44	47	47	45	46
Coffee, tea, spices, chocolate	16	17	18	19	17
Total food	1425	1476	1442	1440	1446

[1] Data compiled by American Butter Institute, Chicago.

[2] The figures given here on dairy products do not check with similar data published in FOOD INDUSTRIES in January, 1932, page 2. The data given here, however, is correct, the previous figures being too high.

[3] In terms of whole milk.

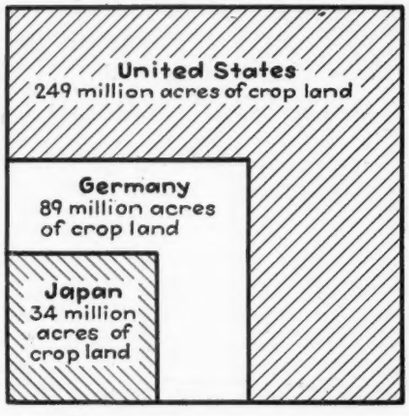
[4] Including butter.

[5] From *The Dairy Situation*, August, 1938 (added). This item is included also under "Manufactured."

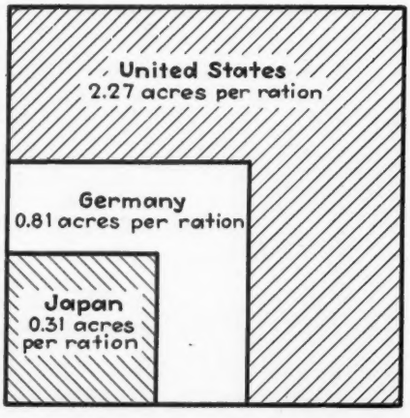
tions are shown in the charts which compare conditions in Germany, Japan and the United States. That the picture presented and conclusions drawn may be undistorted, the charts are based for the most part on statistics of ten or fifteen years ago. At that time food consumption and production were relatively normal.

As may be seen from the charts, the area devoted to the production of the annual supply of food for one person was much smaller in Germany than in the United States. In the land of the Nazis, the acreage per human ration per year was 0.81; in this country it amounted to 2.27. But in Japan the amount of land for growing the food for one citizen was even less than in Germany, being 0.31 acres, or only about one-eighth that of the United States.

In the countries where the smaller acreage is available, emphasis has been placed on food that can be used directly for human consumption. Not only have the crop lands in both Germany and Japan been more intensively cultivated than in the United States, but a higher proportion of the acreage has been devoted to crops producing a larger amount of food per acre, such as potatoes, sugar beets and other vegetables. At the same time, the amount of farm produce fed to animals has been restricted in both Germany and Japan. This has been done because only a small proportion of the grain fed to animals is recovered in the form of meat, milk or poultry products. Only about one-third of the crop in Germany was used for feeding animals. In Japan, the percentage



Comparison between Japan, Germany and United States in land areas used to produce rations for 110,000,000 people for one year. Figures in chart represent millions of acres.



Comparison between Japan, Germany and the United States in number of acres used to produce one human ration for one year.

was still smaller, while 78 per cent of the crop in this country was available for animal feed.

The relative amounts of land in food and forage crops in Japan, Germany and the United States are shown graphically on the outline map of the United States. A glance at this map will show why Americans need not fear having to tighten their belts to compensate for lack of edibles to fill out the waistline. That there is no danger of food shortage in this country becomes evident when we consider that both Japan and Germany were able to produce a fair diet on a much smaller land area.

Of a total land area of 94,527,000 acres, Japan has under cultivation in food and forage crops 15,780,000 acres. As shown on the map, the total area is equal to that of the New England states, New York, New Jersey and about half of Pennsylvania, while the area in food and forage crops is equivalent to about three-fourths of the area of Maine. The total land area of Germany, 116,649,000 acres, would cover the states of Washington and Oregon plus about one tenth of California. The 44,705,000 acres which the Nazis have in food and forage crops is slightly larger than the area of Washington. Compared with these figures is a total land area in the United States of 1,937,145,000 acres, of which 292,321,000 acres is cultivated for food and forage crops. The latter, as shown on the map, is equal to the area of North Dakota, South Dakota, Nebraska, Minnesota, Wisconsin, Iowa, Illinois and part of Missouri. If needed, the cultivated area could be enlarged.

Experts declare that the population of the United States is becoming stabilized and may never increase above the present level by more than 30 millions. And a far greater increase than this could take place before a slow shift from animal to vegetable food would be indicated.

Even with the present acreage under cultivation there is available in the United States enough food of all kinds to meet the needs of an appreciable increase in population. Evidence of this is found in the current endeavors of the government, the food industries and the growers to evolve a plan for moving surplus crops into consumption—and this following years of crop curtailment.

To paint the picture in miniature, any changes made in the American diet will follow the dictates of consumer tastes, not of scarcity. And any restrictions in the diet will be for sake of conserving the figure, not the food supply.

Automatic Machine Fillets Fish

Makes Better Product at Less Cost

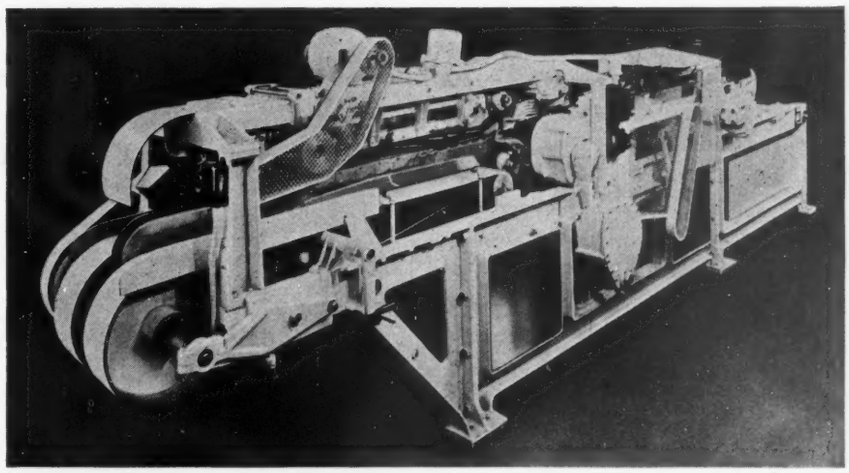
AFTER several years of research and development, The Atlantic Coast Fisheries Co. has completed and put into operation in Boston an automatic high speed machine for filleting fish.

From its beginnings in 1921, the practice of filleting fish grew rapidly. It made possible neat, presentable, branded packages suitable for display and sale in quality food markets; it made a far more convenient and presentable product for the housewife; it halved the shipping of the edible part; and it has the effect of saving one-half of the entire catch for conversion into byproduct fish-meal. Not only did the production of fillets increase, but a rapid expansion was brought about in the catch of fishes suitable for filleting, especially haddock and cod.

Need for an automatic filleting machine was early recognized, and an attempt was made as early as 1924 to fillet by machine. Since then several machines have come and gone, because none of them met the really exacting requirements which must be met by a successful filleting machine.

The first of these requirements is not only to remove the maximum possible quantity of edible flesh from the bony structure of the skeleton, but to operate at high speed on cod, haddock, pollock and other fishes of the commercial run of sizes. Cod and haddock actually have about 55 per cent of removable edible flesh. After the flap or belly wall is cut off, but with skins on, the net is about 50 per cent. Hand operation ordinarily yields only about 42 per cent or less, because it has been proved impossible in practice to do a thorough job of cutting by hand around the curved contours of the bone with a straight knife, or, indeed, by any kind of manual operation. The difference of 8 per cent is what is sought to be saved by more efficient machine operation.

The Hunt machine, now completed by The Atlantic Coast Fisheries Company, realizes nearly all of this difference; and in tests it has repeatedly realized it in full, and on sizes of cod and haddock from 1.5 to 10 lb. This machine effects this saving by cutting very closely and precisely along the curved contours of the backbone and around the ribs. The value of the saving in additional flesh alone thus recovered by machine operation, and at the usually prevailing lowest price of fish, is around ¾ cent per lb. of fillets. This saving is worth several times as much as the total labor cost of hand filleting. Such a machine is, therefore, well worth while, even if it did not effect any economy in labor. The total direct saving on the same basis is in excess of 1 cent per lb.



The Hunt fish-filleting machine

By HARDEN F. TAYLOR

President
The Atlantic Coast Fisheries Co.,
New York, N. Y.

Also, quite as important, is the conservation of fish made possible by this increase in yield of edible portions. By hand operation an annual production of, say, 80,000,000 lb. of fillets would require, at 42 per cent yield, a total of 190,000,000 lb. of whole fish. At 49 per cent yield by machine filleting, the same 80,000,000 lb. of fillets could be produced from 163,000,000 lb. of whole fish, and 27,000,000 lb. of fish, or 7,700,000 individual fish, could be left in the water. To put it another way, 13,500,000 lb. more of fillets could have been produced from the same 190,000,000 lb. of whole fish.

The filleting machine has also been sorely needed in the fish industry because of the fluctuation in the supply of fish to be filleted. It is in the nature of the fish industry that the quantity of fish arriving in the landing ports varies greatly from day to day because of such things as weather, luck, coincident landings of numerous vessels, and the like. These fluctuations give rise on some days to large supplies of good fish in excess of immediate demands, and to scarcities on other days. The result, of course, is widely fluctuating prices. With manual operation, it is impossible fully to adjust the size of a labor force to such fluctuations in raw materials to be handled.

The Hunt filleting machine is designed to operate at 55 fish per minute, which, with allowance of 9 per cent lost time in practice, nets 50 fish per minute. This makes possible the working up of large quantities during periods of glutted markets with less corresponding penalty on days of scarcity, and with a minimum of delay and deterioration.

Appearance of the fillets produced by machine is also a great improvement over hand cutting. They are smoother, trim and of standardized shape, besides being less torn and abused by rough handling.

The Hunt machine is designed and built as a fine precision machine. The working parts are of stainless steel and other sanitary alloys, with ball bearings, enclosed gears housed in oil, pressure lubrication, etc., suitable for continuous wet manufacture.

Converting Batch Operation

Makes Better

This is a very unusual article by a very unusual man. Even though your business has nothing to do with jelly making, you should read it to discover what he has done to improve quality control by changing a batch operation to a continuous operation.

If your business involves hydrolyzing and* COOKING *or* EVAPORATION, *you will be well repaid for careful study. Of course, jelly and preserve makers will read it, but we commend it in particular to* BREWERS *for reasons explained in the editorial pages. Beer and jelly have nothing in common except certain methods.

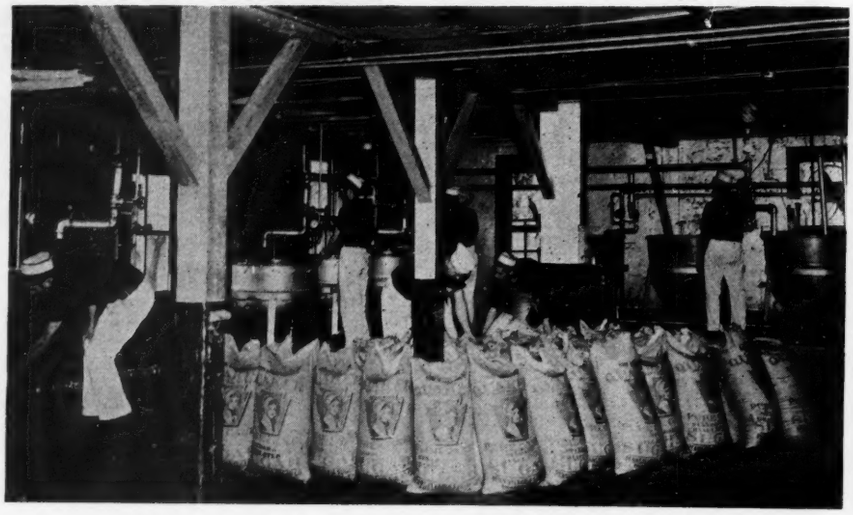
Here is a well known sugar technologist who shows the jelly maker how to do a job better and cheaper; and without realizing it points out to the master brewer the way to a future improvement. Obviously, such an article is for

Food Technologists

Food Engineers

Master Brewers

Preserve Manufacturers



BEFORE *This batch operation turning out cranberry jelly employs nine operators and twelve steam jacketed kettles. In operation, variations of concentration are around ± 2 deg. Brix.*

A CAREFUL ANALYSIS of what is done in the manufacture of a product should reveal the true nature of the several steps in production. If each step, and the part that it plays in the whole procedure, is clearly understood then it is usually possible to design equipment that will not only carry out each step in a separate manner, but do it continuously. When this is done, it becomes possible to put each step under complete control—even automatic control.

As an example of the improvements in control that is possible may be cited the instance of jelly making. When batch methods (50-gal.) were employed, the variations of concentration were always ± 2 deg. Brix.

Another result of conversion of the operation to a continuous process has been the saving of 75 per cent of the former steam consumption. Another still more important result is that there has been a very considerable improvement in the quality of the product.

Up to now, it has always been considered necessary to make jelly in small batches, when boiled at atmospheric pressure. Experience, that dear teacher, has usually shown that jelly made in large batches does not jell.

Fifty-gal. kettles have been the usual size. Some jelly makers are certain that 30-gal. kettles are the maximum possible size.

Why should this idea exist? Is it true? If not, why?

When jelly making is analyzed, it is found to consist of a few simple operations and processes. You take fruit juice, add the proper amount of sugar (and acid, if the latter is lacking), add pectin, if the juice does not naturally have enough pectin in it. Then you evaporate part of the water by boiling until the correct concentration is reached. And that is supposed, by many, to be all that there is to the production of jelly. Nevertheless, there is somewhat more to it than this. Consider, for a moment, what happens to sugar when boiled with an acid.

When sugar, water and acid are boiled, the sucrose is inverted. Inversion also occurs at temperatures lower than the boiling point of water. As will be pointed out subsequently, the rate of inversion is almost as rapid at 190 deg. F. as at the boiling temperature. Below 190 deg. F., the rate of inversion is progressively slower as the temperature drops, but inversion continues very slowly even at 70 deg. F., where it requires many months.

In cooking a batch of jelly, the sugar continues to invert at about the same rate when the temperature of the batch is above 190 deg. F. And this occurs whether the batch is boiling or quiescent, for temperature, not ebullition, is the controlling factor in this case.

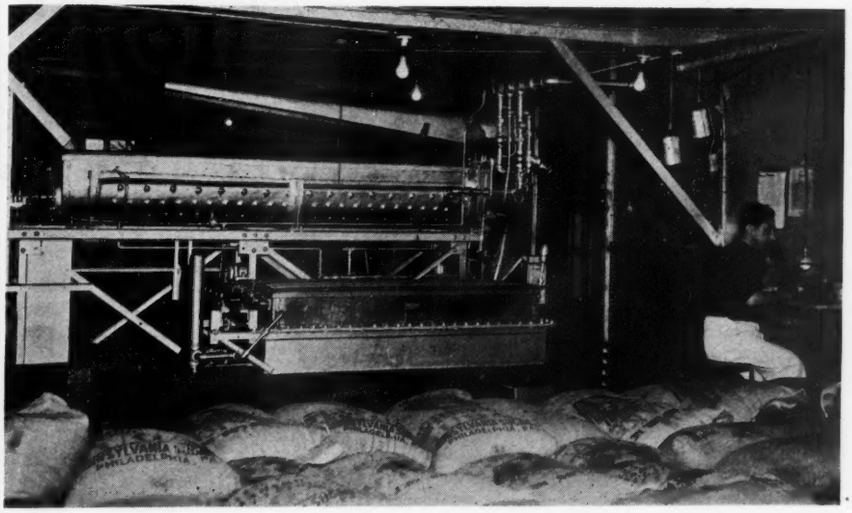
Rate of inversion can be controlled by varying the amount of acidity, i.e., the pH, or the temperature. Invert sugar is a factor in jelly that may be overlooked or the importance of which may be under-estimated.

Rate of evaporation may be varied by varying the amount of acidity, i.e., temperature of evaporation depends on the boiling point of the batch and, of course, is above 212 deg. F. if any substance such as sugar is dissolved in the water.

Temperature of evaporation may be

To Continuous Process

Quality Control



AFTER ***When carried out as a continuous operation, the same cranberry jelly operation requires only one operator, shown seated at a desk operating a refractometer. Output is the same. Variations in concentration are reduced to ± 0.1 deg. Brix.***

controlled by reducing the atmospheric pressure. This can be done by boiling in a vacuum.

Thus, we have the following factors to be controlled:

1. Rate of evaporation.
2. Temperature of evaporation.
3. Time of evaporation.
4. Rate of inversion.
5. Time of inversion.

Further along in this discussion it will be shown how each of the foregoing five factors can be put under perfect automatic control. For the present, however, the discussion will deal in the scientific principles of control in the manufacture of jelly.

First, let us assume that, in producing a jelly, the quantities of pectin and acid in the batches are constant. But that the rate of sugar inversion and evaporation are variable (these can be varied by boiling under atmospheric pressure or under vacuum). Next, we will follow through on what occurs in the batch, for this knowledge is very important because variations in evaporation and inversion will affect the flavor and color of the jelly. Also influence its texture, palatability and appearance.

The chemical equation for formation of invert sugar from sucrose is:

By G. T. REICH

Pennsylvania Sugar Co., Philadelphia, Pa.

Sucrose	Water	Dextrose	Levulose
$C_{12}H_{22}O_{11}$ +	H_2O =	$C_6H_{12}O_6$ +	$C_6H_{12}O_6$
342 lb.	18 lb.	180 lb.	180 lb.

Such a combination of dextrose and levulose is known as "invert sugar" and the process of converting sugar into invert sugar is called "inversion." According to this reaction formula, 100 lb. of sugar combined with 5 lb. of water can yield 105 lb. invert sugar. Consequently, the manufacturer of jelly or marmalade, knowing this, is able to reduce the time required for evaporation and may still increase the density of his product by combining sugar with a predetermined amount of water. This produces invert sugar and an increase in density of from 1 to 3 deg. Brix.

Important Factors in Inversion

In order to carry out the inversion, we must take into consideration: (1) the hydrogen-ion concentration or pH or acid content; (2) Density of the syrup; (3) Time and temperature of cooking; (4) Salts, which have a tendency to retard the inversion; (5) Whether the process is carried on under vacuum or atmospheric pressure. In the case of cranberries, the pH content needs no adjustment. With fruits such as apples and peaches, which are deficient in acid, the addition of citric, tartaric or malic acid serves to remedy this deficiency. Each of these acids has its own characteristic rate of inversion. Tartaric acid is the fastest; next in speed is citric acid; while malic acid is the weakest. Regardless of which acid is used, as long as the pH is constant, the temperature has a direct relation to the rate of inversion. Very little effective inversion will take place below 140 deg. F. Above 140 deg. F., the speed of inversion increases very rapidly, and from the jelly manufacturer's standpoint, a temperature of from 180 to 200 deg. F. gives just the right rate of inversion—combining speed with control of the proper amount of inversion.

We find that many manufacturers have gained the impression that in order to obtain a good cook and proper sugar inversion, the syrup with the fruit juice must be cooked at a high temperature; whereas, in reality, only a rapid cook is desired. But a somewhat prolonged inversion period at a temperature below the boiling point of the liquid, will result in a product far superior to the one continuously boiled for the entire time.

A certain percentage of invert sugar in the jelly is very desirable as this prevents the crystallization of sugar. Invert sugar also improves the taste because it has a honey-like

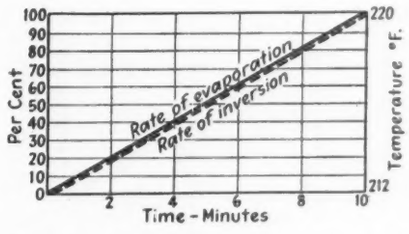


Fig. 1—Atmospheric evaporation and equal rate of inversion without the addition of acid.

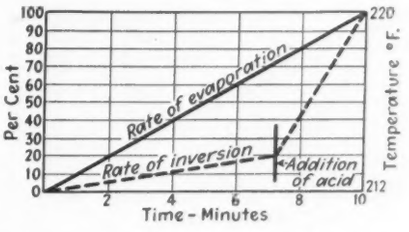


Fig. 2—Atmospheric evaporation and variable rate of inversion with the addition of acid.

flavor, and it imparts a smoother taste. While an excess of invert sugar, which may have been formed by the unduly prolonged heating, has a retarding influence upon the jelling power of the liquid, the acid taste is somewhat harsh and is apt to cover up the more delicate fruit flavor. If the inversion is carried too far at a high temperature, part of the invert sugar called levulose, is readily decomposed, thereby imparting a burned taste, decreasing the sweetness of the product and affecting the color by caramelization.

By keeping in mind all the factors which are at work in forming a batch of jelly, it is possible to compute on paper what will happen—and how much—under the various combinations of circumstances. Seven of the possible different combinations of circumstances are worthy of consideration in this discussion.

Case I—*Standard Practice*

The standard process of jelly making is the traditional method of boiling at an atmospheric temperature at a constant rate of evaporation. The cook is finished at a predetermined temperature or at a predetermined jelly-strength test. In Fig. 1 is a graphic presentation of one of the conditions that may occur during the boil. The rate of evaporation and rate of inversion of the sugar run parallel throughout the entire cook, and by the time that 100 per cent of the water to be removed by boiling has been evaporated, it is found that all of the desired inversion of the sugar has taken place, i.e., 100 per cent of the desired amount (not 100 per cent of the total amount of sugar present).

In this case, any variations in the steam pressure prolong the period of evaporation, and hence prolong the time of inversion. Thus the inversion may be carried too far by pressure variations in the steam line. And the jelly cook may be tempted to try to "doctor" a batch by adding pectin to try to offset the liquifying property of invert sugar. In this example, it is assumed, merely as an example, that the cook is 100 per cent finished when the temperature reaches 220 deg. F. (in ten minutes).

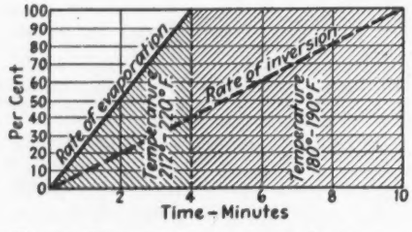


Fig. 3—Evaporation at atmospheric pressure and completion of inversion at a temperature below the boiling point of the liquid.

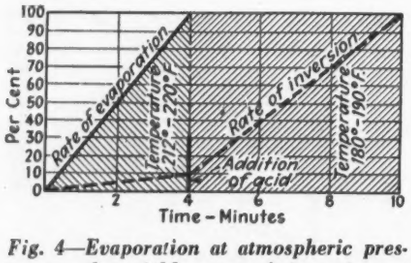


Fig. 4—Evaporation at atmospheric pressure and variable rate of inversion at variable temperatures and acid content.

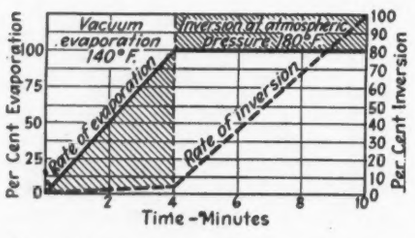


Fig. 5—Vacuum evaporation and inversion at atmospheric pressure below the boiling point of the liquid.

Case II—*A Fruit Deficient in Acid*

Take the case of a fruit which is deficient in natural acid, but assume a rate of evaporation at atmospheric pressure identical with that shown in Case I. Assuming a ten minute boil to remove the necessary amount of water, with this deficiency of acid, the inversion will be slower than in Case I. It is possible to add the necessary amount of fruit acid to reduce the pH (increase the acidity) to a figure which will bring about the desired amount of inversion in the last three minutes of the boil. In Fig. 2 will be found a graphic presentation of the course of events in such a batch.

No vacuum evaporation is considered at all in either Case I or II because, under high vacuum with low temperatures, the rate of inversion is negligible.

Case III—*A Continuous Process*

Now consider a continuous process of jelly boiling. The rate of evaporation is very rapid; in fact, so rapid, that only 40 per cent of the required amount of sugar inversion can take place during the boiling period. Under this set of conditions, it is possible to produce a satisfactory jelly only by creating a separate operation to complete the inversion at a temperature below the boiling point. (The practical application of this principle is described more fully later on.)

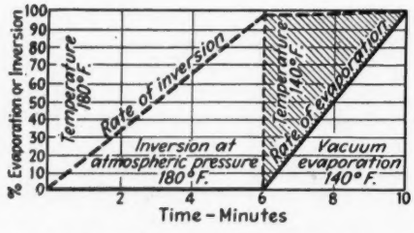


Fig. 6—Inversion at atmospheric pressure first below the boiling point of the liquid and final evaporation under vacuum at 140 deg. F.

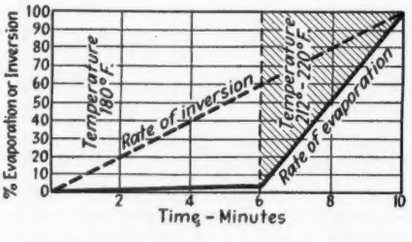


Fig. 7—Partial inversion below the boiling point of the liquid and final inversion and evaporation simultaneously at atmospheric pressure.

Jellies are a combination of pectin, acid, sugar and water. The excellent work of Tarr and Baker has shown that the ratio of pectin to acid in jelly is well defined, while the amount of sugar present may be variable. Actual experience has shown that, by taking special precautions, the manufacturer is able to decrease the sugar content, or increase the ratio of acid-and-pectin to the sugar, by taking advantage of the increase in density or total solids that occurs after inversion of the proper amount of sugar. Furthermore, a manufacturer can increase his production and decrease his labor and fuel costs by operating on the continuous basis, *carrying on the inversion below the boiling point of the liquid,* and evaporating separately either under vacuum or at atmospheric pressure. Incidentally, under this procedure, scum formation is negligible and a very clear jelly results.

Variations that are possible in a continuous process are shown graphically in Figs. 1 to 7, although in Fig. 1 we have the conditions that are customarily found in ordinary batch boiling in open kettles.

Case IV—*Converting Case II to a Continuous Process*

The product in Case IV (Fig. 4) is identical with that produced in Case II, where the fruit is deficient in natural acid. But in this instance, the cooking has been changed to a continuous process, so that evaporation is carried out under atmospheric pressure until completed. This gives a final temperature of 220 deg. F. Then the temperature is dropped to 180 to 190 deg. F. and held there, additional acid is added, and inversion takes place to the required extent without further boiling.

Case V—*Continuous Vacuum Evaporation of a Normal Jelly*

In Fig. 5 is shown the graphic analysis of the several steps which would occur separately in a continuous vacuum evaporator operating at 140 deg. F.—a temperature too low for satisfactory inversion of the sugar. Hence, after the requisite amount of water is evaporated at 140 deg. F., it is necessary to raise the temperature of the batch to 180 to 190 deg. F. to complete the inversion. But the temperature never goes as high as the boiling point under atmospheric pressure.

Case VI—*Inverting Sugar Before Evaporating*

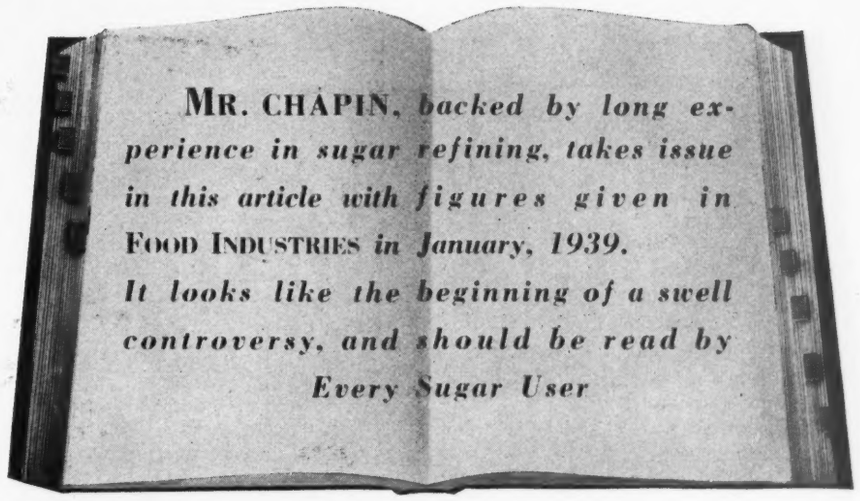
To carry on the idea of having all steps of the process under perfect control, with the continuous process, consider the problem of converting the sugar before evaporation. Sometimes this order of events is desirable when it is necessary to have a high percentage of invert sugar. It is especially important when whole fruit is to be cooked.

Here we have a sort of pre-inversion

(*Turn to page 230*)

There's More to SUGAR REFINING COSTS

Says E. E. CHAPIN
R. S. Kent, Inc., Engineers, Brooklyn, N. Y.


MR. CHAPIN, backed by long experience in sugar refining, takes issue in this article with figures given in FOOD INDUSTRIES in January, 1939.
It looks like the beginning of a swell controversy, and should be read by Every Sugar User

THE annual U. S. consumption of sugar is about 12,000,000,000 lb. and costs close to $600,000,000. This is big business. And you will find that more people know the price of refined sugar than the price of any other commodity. Perhaps this is because it presents itself so continuously to our gaze at every meal. From early childhood sugar means something desirable. This extremely prominent place which sugar holds in our daily lives is more strongly emphasized if it also enters into our business affairs.

This prominence has been fostered by the prevailing merchandising methods and emphasis is always placed upon small differences in cost. The importance of cost is also magnified by the fact that for all manufacturing purposes all refiners produce similar grades; therefore the most outstanding point to consider in purchasing is the price. The natural thing is to shop around for the lowest possible price and I am sure that $10 on a carload of sugar looks much greater to many purchasing agents than $10 on a gallon of flavoring.

Naturally, if unchallenged statements are made to the effect that an industrial set up is uneconomic, the buyer of large quantities of the products of such an industry can easily be persuaded that acceptance of a different type of producing unit would bring his firm considerable savings. A natural outcome has been the advocating of other and newer methods of manufacturing which may be susceptible of voluminous propaganda and rash promises.

Refiners have felt very complacent in the knowledge that most of the new processes which have been promoted were founded on a lack of information of the true economics to be considered; also that newcomers in the industry have had a hard row to hoe and any apparent success has been temporary and mostly dependent on some twist of the quota regulations or a loophole in the tariff. New refineries have been proposed as economic possibilities where the calculated returns were based on a spread of $1.25 between the cost of raw sugar and the selling price per 100 lb. of refined product.

Refiners have finally done themselves, as well as the public, a very material service by publishing such data as will quash many claims for new cost saving refining units. In "Sugar Economics, Statistics and Documents," published by the U. S. Cane Sugar Refiners Association (mentioned under Books Received in FOOD INDUSTRIES, February, 1939), the margin between raw and refined based on actual net costs and sales return was $0.877 from 1931 to 1933, and $0.866 from 1934 to 1937, inclusive. This margin includes the monetary loss represented by the non-sugar substances contained in raw sugars, and the actual mechanical losses during the process of refining. If publicly quoted prices are considered, the 1934–1937 margin between raw and refined prices appears to be $1.107.

To those who do not know the system of contract sales as conducted by the refiners, the foregoing cost figure has been considered to be approximately the actual margin. This is the first time that the true margin has ever been published. And it indicates just what the average buyer has had to pay during that period for his granulated sugar over the net cost of an equal weight of raw sugar to the refiner who, by the way, probably has paid less for his raw sugar than you or it could hope to average.

A U. S. Tariff Commission Report set forth the average cost of refining sugar in a tabulation for all United States refiners as $0.619, including the cost of the bag.

The U. S. Treasury Department considers that it requires 107 lb. of raw sugar to produce 100 lb. of refined granulated, therefore the difference between $0.866 and $0.619, or $0.247 must contain the cost of the extra 7 lb. of raw sugar, all the mechanical losses, sales, distribution, and collection costs, and any profit made in the business.

The first serious competitor of the standard type refining unit was refining by use of decolorizing carbons. The advantage was reputed to be in cheapness of equipment and of decolorizing material. The first publicized data were based on refining with a high grade raw sugar and after

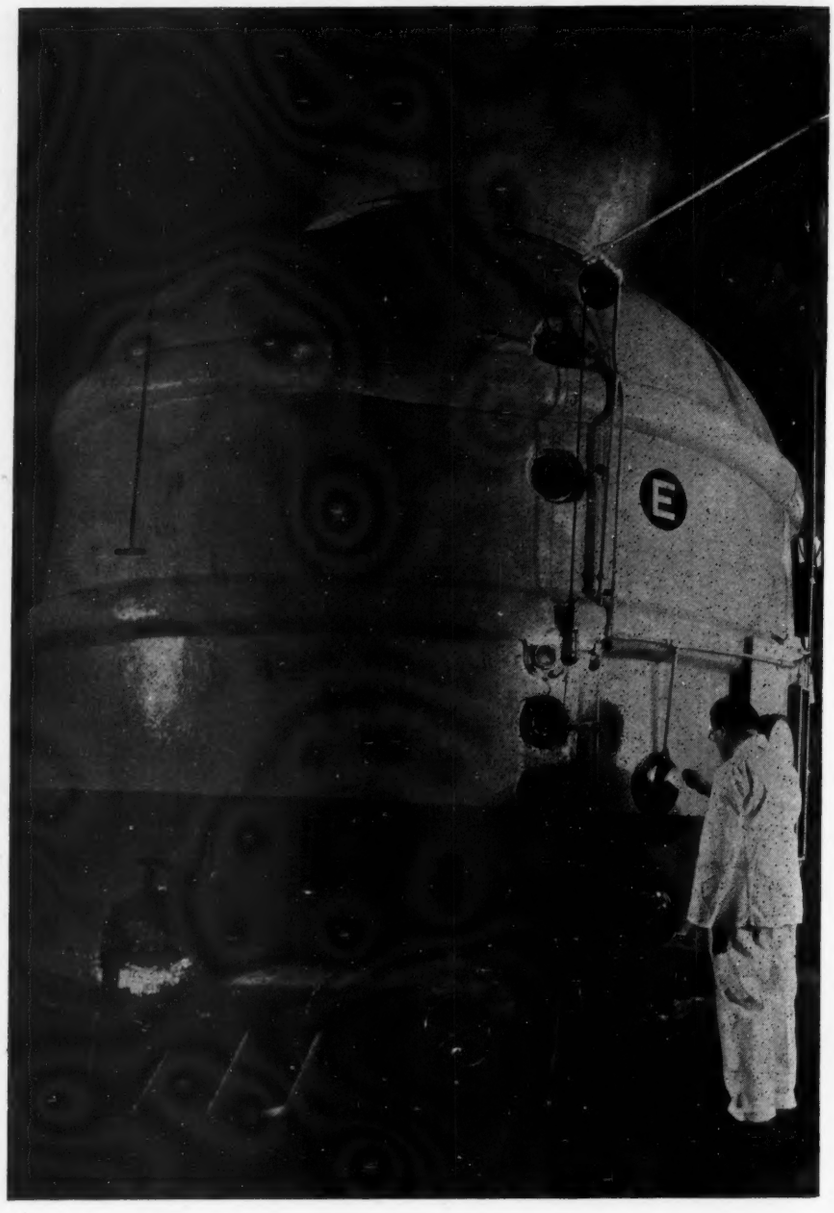
taking out what was readily converted, the residue was turned back to the raw plant at a price for the sugar which it contained at the same price as originally charged. In other words, they bought whole milk and after skimming off the cream sold back the skimmed milk at the whole milk price.

When decolorizing carbons are used it is necessary to employ from 1 per cent to 3 per cent on the weight of sugar refined and, while the solution may be decolorized, it is not possible to remove much of the impurities from the solution with that small amount of carbon. This is important, because carbons are so expensive that they can be applied economically only to very pure solutions and this requires that the raw sugar shall be washed in centrifugals and these washings can only be used in recovery of the contained sugar (about 10 per cent of the original raw) by boiling in a vacuum pan and making raw sugar from them again or by partly decolorizing, clarifying, and selling at a low price as a syrup which may be slightly better than molasses.

The inability of the carbon to remove quantities of impurities above a fraction of its own weight makes it also less easy to exhaust the washed sugar solutions and they too must be boiled up for raw sugar sooner than liquors from bone char filters. All this reboiling is very costly in respect to process steam and requires the most costly of all refining equipment. In fact, to refine equal amounts of the same sugar, the plant using decolorizing carbon must have more centrifugal machines for washing of raws, more vacuum pans for reboiling, and more centrifugals for reworked sugars than in a bone char refinery. The only apparent advantage is in size of buildings to house the bone char filters and revivifying equipment, but the answer is really in the actual cost of treatment. I know a well-managed char refinery which finds the cost of char and its total application to amount to not over 3 cents per 100 lb. of sugar produced.

In small units where decolorizing carbon is used, it may be exhausted and thrown away, while in larger units it is customary to install equipment for reactivation. In either case, tanks and filter presses are required and the initial cost of the carbon and the losses during reactivation are comparatively high. The reactivation equipment is quite expensive. It is very apparent that 3 cents can little more than cover the cost of the carbon treatment.

The larger removal of impurities by the bone char permits the production of brown sugars, which return more to the refiner for the non-sugars that were in the original raw sugar purchased than is possible by any other process. If decolorizing carbon, and its use, cost nothing, one could only save 3 cents per 100 lb. by using it.



The next refining method to come into practical use took advantage of the bleaching action of chlorine gas to remove color from raw sugar solutions. This process could not remove impurities. And, in fact, the substances into which the coloring matters were transformed remained in solution so that here, as with decolorizing carbons, the raws must be highly washed before chlorine treatment. Furthermore, some mineral matters which must be added with the chlorine will remain in solution. In this method, as with carbons, more residues of less value must be handled than in a bone char plant. It is also claimed that the invert sugar is broken down by chlorine, thereby allowing more sugar to be crystallized out. But, if the invert sugar is broken down, it leaves very undesirable substances in solution in its place.

So far, this discussion has applied to the production of granulated sugar and, while rather sketchy, has shown some pertinent points for comparison of the three methods.

Some large users of sugar are interested in the possibility of obtaining it in liquid form and in what can be done with it if obtainable. The history of liquid sugar runs back to 1920 and it gradually expanded in importance until today six plants are pro-

ducing in New York; one in Indianapolis; and two more have been announced; a decolorizing carbon plant in Chicago; and one of a new type of unit in Milwaukee. Initially, the process of producing liquid sugar was to use decolorizing carbons on highly washed sugar, but many variations have been worked out by those who still use carbons.

Some very high-grade sugars and pure sugars in liquid form have been imported to save the expense of working off the low-grade material at the plant in this country. In 1929, a large sugar refiner began the sale of a very pure high-grade liquid sugar in volume and the variety of uses was considerably increased, largely stimulated by the lowering of the price to 30 cents per 100 lb. solids under that for granulated sugar. Certain importations of liquid sugars containing sufficient invert sugar to change the custom classification began in 1929. Both the duty and price being low, there was money to be made even though considerable freight cost was absorbed. This condition widened the field of distribution and shipments were made as far as Illinois points. Today, the duty and price advantage has largely decreased until the cost of these syrups is nearly that of production in this country from raw sugars.

The acceptance of liquid sugar on a cost basis indicates that the producer must be able to turn out liquid products cheaper than granulated sugar. Let's see what the difference in cost should be. The most evident saving is in the cost of a bag, which may be fairly set at 12 cents. Also less equipment is required for granulating, packing, storing, and shipping. While the sale of this product is cutting into granulated sales—and equipment must lie idle in the large refinery in consequence—still, idle equipment does not cost as much to carry as if labor, power, etc., were also used. The plant made for liquid sugar has greater savings by having no idle equipment, but, as previously stated, the larger refiner can convert the low-grade portion of his raw sugar into much more valuable products than can the small plant.

It is often remarked how colossal are the present refineries using bone char, but I venture to say that no other food industry turns out so great tonnage per unit of size. Smaller plants could not eliminate much size per unit because the vacuum pans, centrifugals, etc., are identical in all types of refineries. The warehousing of the many grades of sugar and types of packages, which only the large refiner can produce economically, occupies considerable space.

This brings up a comparison which has always appealed to me—that the large refinery and the small one are very much like the big department store and the many small stores. We know by experience that they can both live and fulfill each his own function, and we may need them both. The only thing that is missing in this comparison is the lack of goodwill advertising on the part of the large refiner. If he had told the story of his usefulness occasionally, he would have more consideration from all sides and at least some appreciation for the part he plays in unifying the price of sugar over the country and in supplying the many forms of sugar which seem needful to our requirements.

This comparison between the department store and the many small stores brings up the most recently promoted scheme of "every man his own refiner," though perhaps this more nearly compares to a news-stand than to a competing store.

In the January number of FOOD INDUSTRIES there was described a refining unit for $9,800, which was depicted as everything cheap and simple. The stated costs of production did not include those features which are usually first considered and yet $0.50 per 100 lb. was set down as the cost of materials, loss in process, premium for the raw sugar purchased, and $0.10 for royalty or "compensation." Nothing was said about rent of the minimum 1,500 sq.ft. of floor space, power and light, steam, insurance, taxes, interest on investment, depreciation, or labor.

A conservative average cost for installation would be 45 per cent of equipment cost, but if we use half of that, or 22½ per cent, it is slightly over $2,200. This would make the actual installed cost without freight to the plant $12,000. On this amount, depreciation could not be conservatively based on more than a seven-year period when handling acid sugar solution containing decolorizing carbons. That makes $1,714 per year. Interest at 6 per cent equals $720 per year. Rent of 1,500 sq.ft. at $0.40 equals $600 per year. Steam and electricity should cost $0.06 per 100 lb. of refined product, but let's be fair to the process—if not to the operator—and call it $0.03 per 100 lb. of product. Insurance and taxes can hardly be less than $0.01 per 100 lb. Labor and supervision can be argued about until actual average figures are available, but the cheapest (Cuban) costs for refining that I know to have ever been published after authoritative investigation were $0.0414 per 100 lb., so let's take half of that as a basis for argument, or $0.0207. Don't forget that there were two workers in the picture, which would mean an actual cost of at least $0.08 per 100 lb.

According to these estimates, for 10,000 lb. daily sugar production and 250 days per year, the costs would be per hundred pounds of dry product:

As set forth in the prospectus..	$.5000
Depreciation	.0686
Interest	.0288
Rent	.0240
Steam power and water	.0300
Insurance and taxes	.0100
Labor	.0207
	$.6821

If we turn back to the stated differential in cost between raw and refined, $0.866 per 100 lb. and use the differential to purchasers of high-grade liquid sugars, now $0.30 under refined, we see that with this new unit we can

(*Turn to page 240*)

Engineering Analysis Shows

Conditions Affecting Capacity

Using ice cream freezing as an example, this article shows how to determine the effect of temperature and composition variations on economy, output and quality

By ARTHUR W. FARRALL

Senior Research Engineer
The Creamery Package Mfg., Chicago, Ill.

▶ ***Problems of heat transfer, either in* REFRIGERATION *or* HEATING, *or in both, occur in most food manufacturing plants. And there is no other unit operation in food processing that presents better opportunities for improvements in plant economy and in quality of product than does* HEAT TRANSFER. *It is for this reason that the method of studying the relation between refrigeration and freezer capacity, outlined in this article, deserves the attention of***

All Food Engineers

MANY operations carried out in food manufacturing plants can be analyzed by the food engineer, so that he can select equipment of suitable capacity for the work that is to be carried out. Also, such an analysis enables the engineer to predict the effect on output that will result from any changes in composition of the raw materials or finished products, or from any variations in the conditions of operation.

Application of analytical methods for the freezing of ice cream will serve as an example of the procedure. Ice cream freezing involves two unit operations: heat transfer, that is, the extraction of heat from the ice cream mix; and mixing, for the production of overrun, that is, the incorporation in the ice cream of a predetermined amount of air in a finely divided state. Both of these operations are carried on in the modern ice cream freezer, with the exception that part of the extraction of heat occurs in a final hardening room or tunnel.

Control of ice cream quality is in part determined by what occurs in the freezer. A thorough understanding of the conditions that affect freezer operation is necessary to the production of quality ice cream. The principal conditions that affect the heat transfer and output of an ice cream freezer follow:

Experience shows that the maximum hourly capacity of batch and continuous type ice cream freezers is determined by conditions of operation and the composition of the mix, as well as the mechanical condition of the freezer. For example, it is known that if the ice cream is to be drawn from the freezer at a temperature of 21 deg. F., the output of the freezer will be less than if it is discharged at 22 deg. F., other conditions remaining the same. The available temperature of the refrigerant, the mix temperature and the final overrun also affect the capacity.

In order to evaluate the general effect of these conditions as they may pertain to any freezer, a number of charts based upon the actual thermal exchange which would take place in a freezer are shown herewith. These charts will explain much of the difference in capacity noted in different ice cream plants using the same type and size of freezer and on different mixes in the same plant. It is assumed that the freezer is in good mechanical condition, and that it is supplied with sufficient refrigeration to maintain a constant refrigerant temperature in the cylinder jacket. Such matters as dull or bent scraper blades, or a foul ammonia system, will of course decrease the output of a freezer in proportion to the severity of the defective conditions.

In a consideration of the freezing of ice cream, it is useful to determine the number of heat units in B.t.u. which must be extracted from each pound of ice cream. This can be done experimentally. It can also be done reasonably accurately by calculation, providing the composition of the mix, the mix temperature, and the ice cream discharge temperature, are known. The method proposed by Leighton (Journal of Dairy Science **10**, 30, 1927) enables one to calculate the freezing point curve for an ice cream mix, as shown in Fig. 1. Then using this as a basis, the refrigeration absorbed by each pound of ice cream in freezing is calculated as follows:

H (total heat) = (Sensible heat of liquid) + (Latent heat of fusion of the water frozen as ice) + (Sensible heat of the semi-frozen mixture below the initial freezing point of mix).

It is assumed that the specific heat of the mix is 0.80; the specific heat of the semi-frozen ice cream is 0.65, and the latent heat of fusion of water is 144 B.t.u. (Note: The specific heat of the mix varies with mix composition).

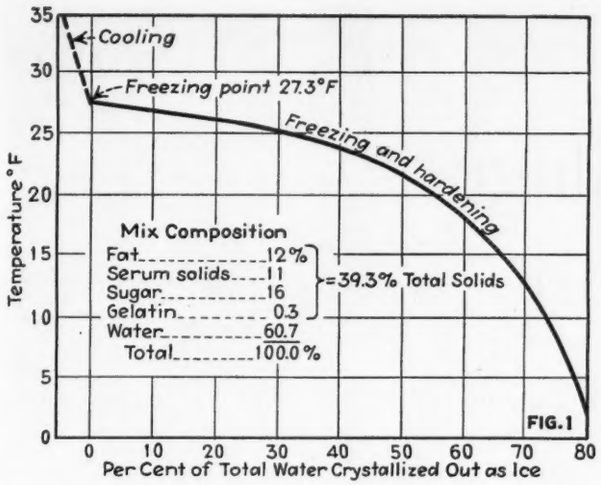
The calculation of the refrigeration requirement for freezing a pound of mix of the formula: 12 per cent fat, 11 per cent milk solids not fat; 16 per cent sugar; 0.3 per cent gelatin; and 39.3 per cent total solids; from mix at 40 deg. F. to ice cream at 22 deg. F., will then be as follows:

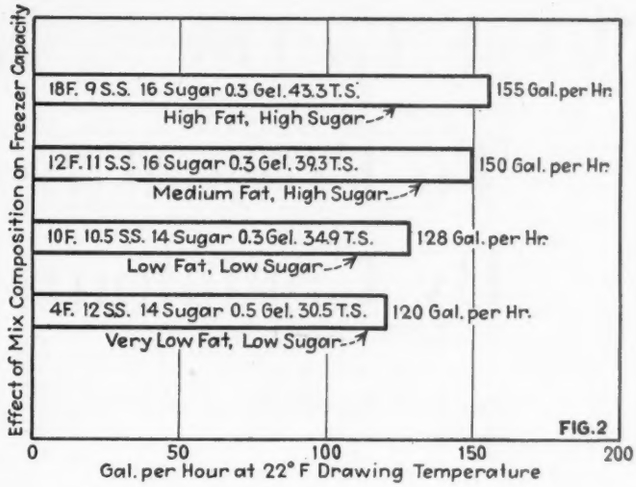
From Fig. 1 it will be seen that (1) 48 per cent of the water is frozen as ice at 22 deg. F., (2) the mix begins to freeze at 27.3 deg. F.

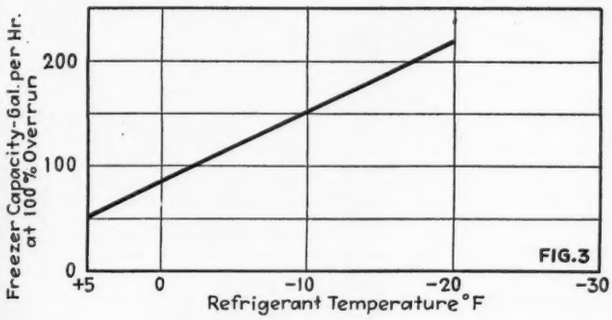
Then:

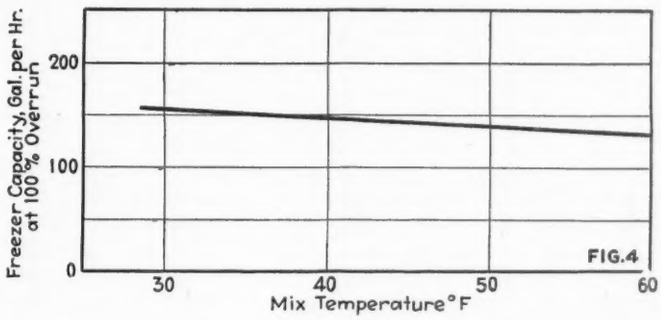
Freezing point of the mix =	27.3 deg. F.
Per cent water in the mix =	60.7
Per cent water frozen at 22 deg. F. =	48.0
Sensible heat of mix = (40 − 27.3) (0.80) =	10.16 B.t.u.
Latent heat of fusion = 144 (.48 × .607)	42.00 B.t.u.
Sensible heat of slush = (27.3 − 22) (.65) =	3.44 B.t.u.
Total B.t.u. absorbed per lb. of ice cream =	55.60 B.t.u.

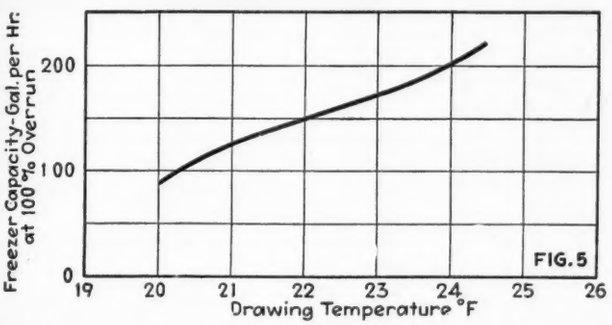
As would be expected, this calculation indicates that the warmer the mix or the colder the temperature at which the ice cream is drawn, the greater will be the refrigeration required per pound of mix; also, that mixes of a high-solids composition contains less water to freeze and, therefore, require less refrigeration than those of low solids.




18F. 9 S.S. 16 Sugar 0.3 Gel. 43.3 T.S. 155 Gal. per Hr.
High Fat, High Sugar
12 F. 11 S.S. 16 Sugar 0.3 Gel. 39.3 T.S. 150 Gal. per Hr.
Medium Fat, High Sugar
10F. 10.5 SS. 14 Sugar 0.3 Gel. 34.9 T.S. 128 Gal. per Hr.
Low Fat, Low Sugar
4F. 12 SS. 14 Sugar 0.5 Gel. 30.5 T.S. 120 Gal. per Hr.
Very Low Fat, Low Sugar
Effect of Mix Composition on Freezer Capacity
Gal. per Hour at 22° F Drawing Temperature
FIG. 2







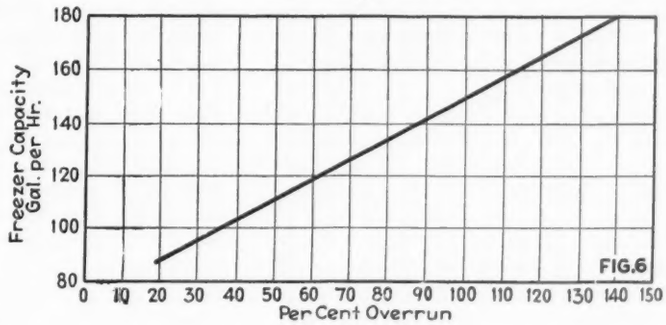


Fig. 1—Freezing-point curve for an ice cream mix

Fig. 2—Comparative capacities of an ice cream freezer, using four common types of ice cream mix

Fig. 3—Effect of refrigerant temperature on capacity in a continuous ice cream freezer

Fig. 4—Effect if ice cream mix temperature on freezer capacity when refrigerant temperature is held constant

Fig. 5—Effect of ice cream drawing temperature on freezer capacity when refrigerant temperature is held at—10 deg. F. and mix temperature at 40 deg. F.

Fig. 6—Effect of overrun variation on freezer capacity, all other conditions being held constant

Fig. 2 shows the comparative capacities of a freezer using four common types of mixes. This illustrates the point that since more refrigeration is required to freeze 1 lb. of a low-solids mix, the capacity of the freezer will be correspondingly lower than if a high-solids mix were frozen. A higher percentage of sugar naturally increases the capacity at a given drawing temperature because the freezing point of the solution is lower and less water is frozen at a given temperature. It is usually necessary to freeze a high-sugar mix to a colder temperature than normal and this may cause a decrease of capacity in actual practice.

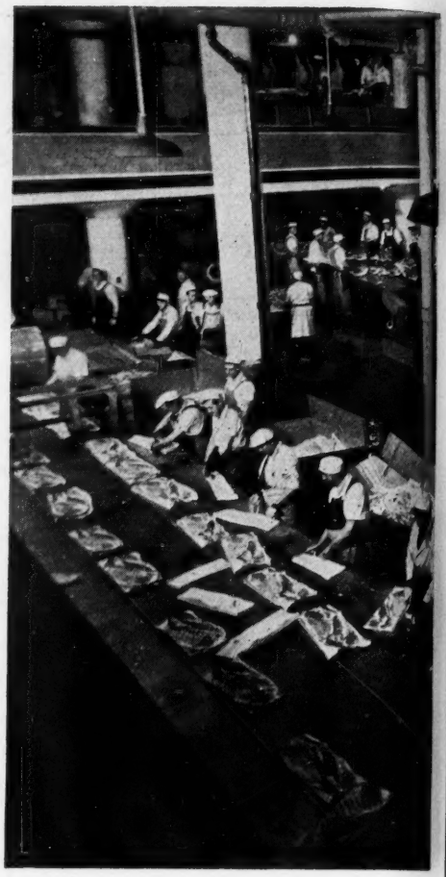
In any calculations of the refrigeration load on a freezer, it is necessary to add the heat equivalent of the power required to drive the dasher. This is 2,545 B.t.u. for every hp.-hr. Some types of mixes, for example, those which have been heavily neutralized or those employing certain commercial salts, may cause the power requirement of a dasher to increase as much as 20 per cent. This has the effect of decreasing the capacity of the freezer because the increased power results in more of the available refrigeration being used up in counteracting the heat of friction rather than in freezing the ice cream.

Fig. 3 shows the effect of the refrigerant temperature on the capacity of a continuous freezer. Assuming a 40 deg. F. mix temperature and ice cream drawn at 22 deg. F., it will be noted that the capacity is increased very rapidly as the refrigerant temperature is lowered, since a greater temperature differential is obtained between the ice cream and the refrigerant under these conditions.

Fig. 4 shows the effect of ice cream

(*Turn to page 229*)

What To Do To Prevent Spoilage By Contamination



Practical suggestions on plant, equipment, personnel and processing

By JEAN E. HANACHÉ
Canning Specialist and Meat Consultant, Ridgewood, N. Y.

BACTERIAL CONTAMINATION does many undesirable things to food products. Not only does it cause spoilage with resultant waste, but it throws products off flavor and so destroys the good effects of a superior formula, the use of select raw materials and otherwise careful processing.

The precautionary measures that may be taken to avoid contamination resolve themselves into repair, painting, replacement and sanitation. Cracks in the plant floors should be immediately repaired. Not only do they retard the flow of waste into the drains and create puddles where spoilage bacteria breed, but they may permit leakage to the floor below and thus carry contamination to other departments.

Cracks in walls likewise must be removed, as they prevent thorough cleaning. After the cracks have been filled, they should be painted appropriately so that the whole wall presents a smooth surface capable of being easily cleaned.

Old and antiquated machinery often is an agency of contamination, impairing the quality of the product. And it is quite surprising that many plants still cling to this type of equipment, especially since it is usually economical from an operating cost standpoint to replace it with new and more efficient equipment.

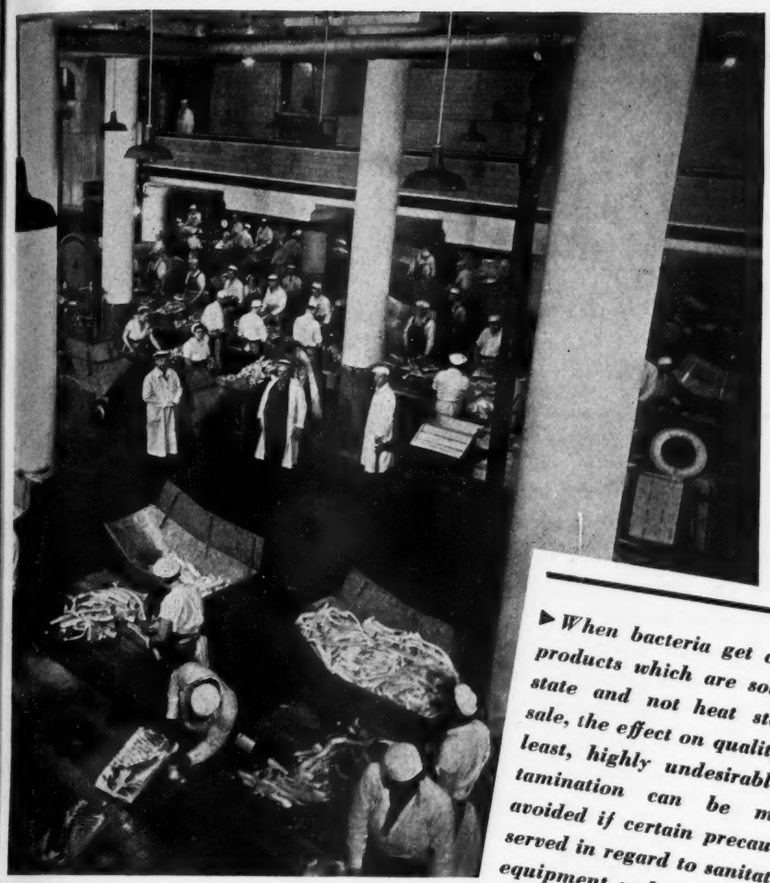
Sanitation should not be superficial, but real and effective. There is a great difference between looking clean and being clean. A water tumbler may appear clean to the eye, while in reality have on its surface a great many bacteria. The same is true of polluted water, which may look very clear and sparkling. All this points to the necessity for scrupulous cleanliness on the part of people working in the processing departments of most food plants and particularly in the cutting room of the pork packing house. The common practice of many is to rinse their hands with running water before resuming work after an indispensable interruption. This is only superficial cleanliness. The hands should be washed and scrubbed thoroughly with soap and rinsed before handling the product. To provide for this, basins with soap and hot running water should be available in various locations of the processing department or cutting room, and the workers should be instructed to use them freely and conscientiously.

In the interest of personal sanitation, it is also of utmost importance that the workers change their uniforms as often as required, for dirty clothes act as a focal point of contamination, especially when the workers wipe their soiled hands on them.

To effect general sanitation in processing departments, such as the cutting room of the packing plant, a good detergent, harmless to human skin, such as trisodium phosphate or sodium metasilicate, should be used for cleaning floors, implements and equipment. The detergent dissolves the grease and dirt and carries them away with rinsing. Then for effecting sterilization, an effective solution of a harmless-to-man germicidal, such as 0.4-0.5 per cent sodium hypochlorite or 1 per cent sodium resinate should be sprayed on all cleaned floors, walls and equipment. This should be left for a few minutes, except on metal surfaces, and rinsed off thoroughly.

Since the detergent recommended is alkali, it should never be used on equipment and tables with aluminum surfaces, for it darkens the metal. For that purpose an organic acid, such as tartaric or citric, should be substituted in cleaning. The sodium hypochlorite solution should never be left too long on metal surfaces as it will cause corrosion. And it should never be used unless the primary cleaning with the detergent has been effectively done. Otherwise, its germicidal effect is completely destroyed. Being a powerful oxidizer, it reacts primarily with the grease and fats, and its germicidal action is destroyed in the presence of either of the latter. It is very appropriate that during the day, from time to time, some of the detergent be sprinkled on the floor. This usually removes the hazard of slipping and at the same time eases the task of cleaning at the end of the day's operations.

In handling food products themselves, two methods of curtailing the ravages of bacteria are available. One is refrigeration, which inactivates the bacteria in or on the product until



Here is a meat cutting room in which sanitation of equipment, building and personnel is as it should be. Tables are of stainless steel and hardwood. Floors are of hard brick and walls are of glazed tile, both easily cleaned. Employees are dressed in clean uniforms. Meat is handled quickly and moved without delay to the next operation. This is the new cutting department of Rath Packing Co., Waterloo, Iowa.

▶ *When bacteria get on or into food products which are sold in the fresh state and not heat sterilized before sale, the effect on quality is, to say the least, highly undesirable. Such contamination can be minimized or avoided if certain precautions are observed in regard to sanitation of plant, equipment and personnel. The author discusses these precautions, making this article of practical value to* **All Food Manufacturers**

such a time as the product is taken from the refrigerated room and exposed to atmospheric temperatures. The other is the use of heat to destroy, partially or completely depending upon the temperature employed, the bacteria in and on the food. With some products, as fresh meat, heat is not desirable, so refrigeration must be resorted to. And in this case it is of utmost importance that every precaution be taken for sanitation in handling the product. Once the food is removed from the refrigerated room, bacteria which get on it through careless handling or insanitary plant conditions begin to develop, and spoilage results.

THIS means that tables, trucks, vats and other equipment with which the product comes in contact must be kept clean. In the cutting room of the fresh meat plant, for example, cutting boards which are old and full of cracks harbor bacteria and render them inaccessible to any mechanical or chemical measure of cleaning or sterilization. Replacement of this type of equipment is absolutely essential.

Also important in processing is avoidance of delays which expose the product to unnecessary contamination.

Considering again the cutting room of the meat plant, caution should be exercised in the removal of fresh cuts to their respective destinations of cooler or curing cellar as soon as the cuts are made. The packer should not wait until a truck is filled, unless this is done quickly. There should be an ample supply of trucks, as allowing too much time for filling the conveyances permits the temperature of the meat to rise and the bacteria to multiply considerably. The author proved this by securing two samples. One was from the first cut placed in the bottom of the truck. The other was taken from a cut on top of the truck load. The bacterial count of the two pieces was in the proportion of 3 to 1, the meat with the high count being from the bottom.

Continuing with the meat cutting room as an example of how food products become contaminated, there is the case of the foreman who brought to the author's attention the souring condition of one of the cuts. While the foreman was discussing this, the butcher who discovered the sourness continued his work without interruption. When questioned, the butcher admitted that he had taken no measures to sterilize his knife. So the pieces which he had cut were marked and inspected the next day. All were sour, because the butcher had unintentionally inoculated them with the souring bacteria which were picked up on his knife from the one soured piece. This demonstrates the necessity for sterilizing equipment exposed to contaminated food before it is used again in the process.

Another source of trouble in the cutting room is the picking up of pieces which fall on the floor and putting them with others in a truck or on a table without taking the trouble to clean them. The least that could be done is to rinse the meat with cold running water.

Where refrigeration is used to prevent development of bacteria on foods, as in meat coolers, it is important to use thermometers properly to be sure that the correct temperature is measured. One or two thermometers in a cooler do not give a true indication of the general temperature of the room. Thermometers should be placed in various locations so that an accurate picture of the temperature can be had. In addition, a recording thermometer should be used and the record of each day's refrigeration kept on file.

Care should also be observed in taking the internal temperature of food products. In one meat plant visited, the author noted that at the onset of the cutting operation the internal temperature of the hams of one or two carcasses only was taken. Such a procedure gives erroneous information. Temperature tests should be made on several of the carcasses in different locations to be sure that the meat is all at the desired temperature (34-36 deg. F.) for ease and safety of cutting.

In regard to the use of refrigeration in the meat plant, it is important that warm carcasses be chilled quickly. The longer the heat remains in the carcass the greater the number of bacteria which will develop. The slow chilling method requiring 48 to 72 hours should not be followed. Modern practice calls for 18- to 24-hour chilling.

The Truth About FROZEN BREAD

Research reveals facts about much discussed product

PART II

By **WILLIAM H. CATHCART**
American Institute of Baking, Chicago, Ill.

▶ ***There are commercial advantages to a method for keeping bread fresh for long periods. So freezing offers practical possibilities. The extent of these possibilities is discussed in this report on research at American Institute of Baking. Part I, published in the February issue of FOOD INDUSTRIES, reported the results of an eating test on frozen bread and discussed previous investigations.***

This article will be of interest to those connected with* REFRIGERATION *and* STORAGE, *as well as

Bakers
Frozen Food Packers

Use of a 200-mesh sieve in carrying out the swelling-power test on bread for staling gives as accurate results as does an 80-mesh bolting cloth. Less time is required.

BREAD frozen at –22 deg. C. was found by the eating-test judges to be as good as the "fresh" bread up to an age of fifteen to twenty days in the freezer. After about the eighteenth day a slight "off" aroma became detectable in the frozen bread. Yet the bread remained "salable" up to about 41 days in the freezer. When the bread had been in the freezer 72, 90, 100 and 137 days, this "off" aroma became so pungent that the bread could not be regarded as "salable." Aeration of the crumb removed the undesirable aroma fairly well. Studies are being carried on at the present to determine the possible relationship between the development of the "off" aroma in the frozen bread and the oxidation of proteins and fats.

Although research has not progressed far enough to enable one to draw definite conclusions as to the cause of this "off" aroma, there are indications that the crust has something to do with it. It seems that on long standing the crust, if slightly burned, imparts a burnt aroma to the crumb. In the same way the normal crust flavor also penetrates the crumb and is detectable. It is not possible to say whether this "off" aroma which develops is simply a mistaken crust flavor or not. Nevertheless, the work shows that the crust of a loaf of bread must be an influencing factor on the flavor of the crumb, especially in a wrapped package where the bread is approximately twenty hours old.

Another interesting fact which has recently been established is that it is definitely an "old" aroma; very similar to the old aroma that develops in a commercial loaf of bread after standing (without drying out) for four or five days. Although it is felt that this aroma is the result of changes in the crust, it is impossible to draw definite conclusions with the research in its present state.

Bread frozen at –11 deg. C. was compared with bread frozen at –22 deg. C., and even after three days the judges found a definite preference for the bread frozen at –22 deg. C. The physio-chemical tests showed that bread frozen at –22 deg. C. staled nearly as fast as that frozen at –11 deg. C.; it did not show the prevalent difference found by the judges and the scorer.

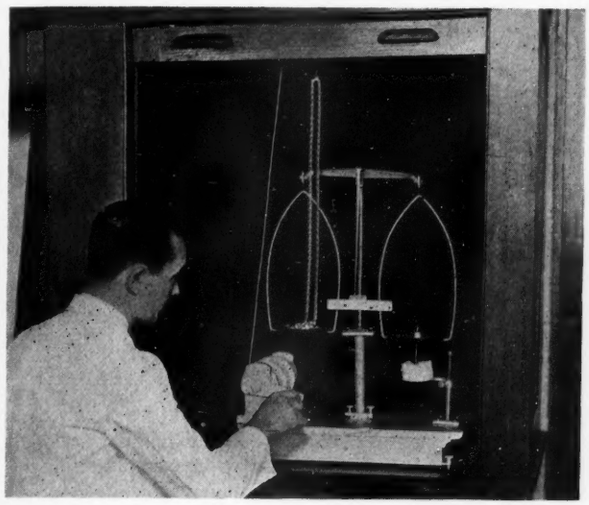
As previously mentioned, bread frozen at –22 deg. C. remained, according to the judges and scorer, as good as "fresh" bread up to an age of fifteen to twenty days in the freezer, and it was "salable" for about 41 days. According to the physio-chemical tests, bread frozen at –22 deg. C. was nearly stale after 24 hours. However, it must be pointed out that the frozen bread never became completely stale as long as it remained in the freezer.

Unwrapped bread stored in a CO_2 atmosphere was also frozen at –22 deg. C. However, after three days in a freezer, "fresh" bread was preferred and after seven days the frozen bread was rated as "poor." Results of these tests, compared with those of tests at –22 deg. C. without the CO_2, indicate that CO_2 in the freezers did not improve the eating qualities of the frozen bread. In some cases, the presence of CO_2 even lowered the eating qualities.

Studies on bread frozen at –35 deg. C. indicated that the staling action is slowed down so that the swelling-power value does not change after 24 hours in the freezer and decreases very little after four days in the freezer. Upon increasing the number of days in the freezer, the swelling-power values reach a minimum and then increase. The results indicate that the bread stales at –35 deg. C. but recovers in "freshness" if its aging at –35 deg. C. is prolonged up to 60 days. After 110 days, the value again decreases slightly. The same trend is also indicated by compressibility tests.

Since there is no known reason why prolonged holding of bread at –35 deg. C. should cause the starch to return towards its "fresh" state after it has reached staleness, the results must be verified by other laboratories before they can be accepted as factual and before theoretical significance can be attached to them.

Results of organoleptic tests on bread frozen at about –35 deg. C. indicate that this bread after nineteen days in the freezer is just as good, if not better, than "fresh" bread. After 60 days, a slight "off" aroma was present. The bread was tested again at 110 and 240 days and found to be still "salable."



Compression of a 2-gram weight upon a uniform piece of bread crumb (1½ in. thick) is another test for degree of staling in bread when carried out under uniform room-temperature conditions. The fresher the bread the greater the compression.

Keeping the bread wrapped during freezing and thawing proved a great advantage in three ways: (1) prevention of water-crystal, or frost, formation on the bread during the freezing, (2) prevention of moisture condensation on the crust during thawing and (3) prevention of loss of moisture during the freezing period and during thawing. The best results were obtained by wrapping the bread before freezing and keeping it wrapped until ready for consumption. Whether the bread is wrapped in waxed paper or transparent cellulose makes little difference.

Experiments on the rate of staling of bread which had been frozen showed that after the frozen bread had thawed out it staled at approximately the same rate as fresh bread which had not been frozen.

In summing up the results of the past one and a half year's work on the freezing and storing of bread at low temperatures, the indications are that, from an organoleptic-test standpoint, wrapped bread frozen in ordinary atmosphere at –22 deg. C. remains "good" for as long as 20 days and is "salable" for about 40 days. Lower temperatures prolong the "good" quality and the "salable" condition periods considerably. However, if the storage period is extended too long, an "off" aroma develops even at temperatures as low as –35 deg. C. From the physio-chemical-test viewpoint, bread stales very rapidly at temperatures as low as –22 deg. C., and at that temperature becomes nearly completely stale after 24 hours in the freezer. Freezing at –35 deg. C. keeps the bread in its original condition for about four days and retards complete staling for eight to ten days in the freezer. However, prolonged storage at –35 deg. C. for 60 to 70 days results in a refreshening of the bread that had become stale.

These results were obtained on an experimental scale and indicate, as did the votes at the Oct. 17 eating test, that bread carefully frozen and thawed after a period of several days or even a month, compares quite favorably with fresh bread. However, many other factors have to be taken into consideration from the cost-of-production angle as well as from the standpoint of improved technic. And more exhaustive studies on causes of staling and formation of "off" aromas are needed before freezing of bread can compare with the freezing of other perishable foods on a practical commercial basis. Although other perishable foods deteriorate slowly during storage, the research studies on these other foods are, in most instances, farther advanced than they are in the case of bread. Surprising changes have been made in the technic and conditions of freezing and storing of these other foods during the approximately ten years they have been preserved by freezing on a commercial basis.

For example, today the modern "quick" freezing methods are regarded as a necessity with fruits and vegetables. Thus, no one should speculate too far into the practical uses of frozen bread until these methods have been investigated. Nevertheless, one might conclude that in this country at the present time, the most logical application for frozen bread seems to be in connection with emergencies, such as break-downs in production and delivery services, floods and war. Other possible applications are for supplying ships not equipped for baking, for leveling off the peaks and valleys in production,

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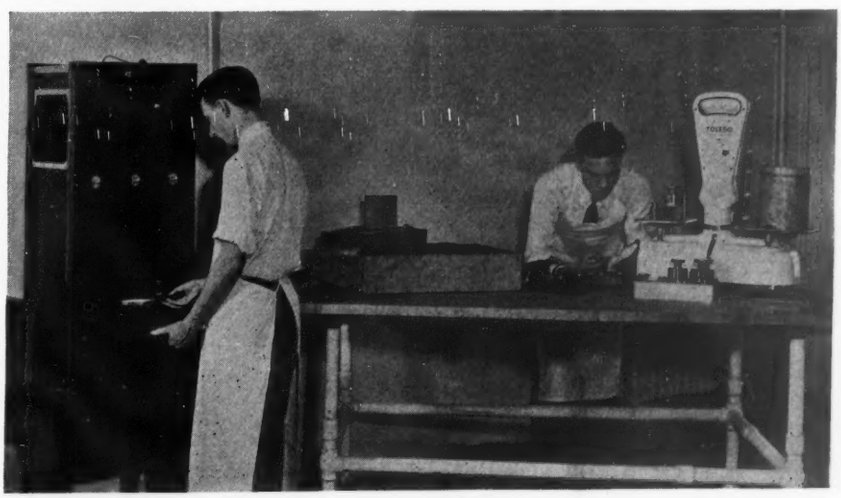


Expert scoring of bread consists of rating it for both outside and inside loaf characteristics. Recent development of a method for photographing bread slices makes possible a permanent record of inside characteristics as well as outside characteristics of a loaf of bread.

These Food Plants *Cut Operating Costs*

Substantial reductions in expenses made through better methods of generating steam and power

By CHESTER R. EARLE
Engineer, Republic Flow Meter Co., Chicago, Ill.

▶ ***One of the most common and most neglected sources of excess operating costs is waste or inefficiency in the generation of steam and power. Increased profits have come to food companies which stopped to analyze power and steam costs and take corrective measures. This article tells where to look for these profit leaks and what to do to convert them to savings. It is of value to***

All Food Manufacturers

Part I

MODERNIZATION of steam and power generating and distributing facilities often results in startling savings in processing costs. There is a plant in which $1,000 each month has been cut from the electric power bill. There is another in which the yearly coal bill was cut $16,000 by changing from a high priced to a lower priced coal. On the other hand, there is a packing plant burning coal at $3.18 per ton in which the cost of steam is $10,000 less per year than it is in a similar plant burning $2.65 coal, the two plants generating identical amounts of steam. There is another plant which is cutting power service costs $6,500 per year on a $12,500 investment in power generating equipment. This will pay for the equipment in less than two years, and the saving, calculated after depreciation and maintenance, will continue. This saving equals a profit of 1 cent per pound on 650,000 lb. per year of additional product, if that could be sold year after year.

Cost of replacing several old boilers with one new one will be returned to another plant in two years, and the saving will be about $6,000 per year. In certain departments of one plant, costs of steam, filtered water and hot water have been reduced 90 per cent by the use of records that show where these items were consumed and why.

You may ask, "How do I know that any such economies can be effected in my plant?" A good way to answer that is to ask yourself some questions:

Do you know your costs of steam and power—*know*, not estimate? Do you know whether or not you are burning the right fuel, regardless of its cost or quality, to give you the lowest cost of steam? Do you know that your boiler plant is burning that fuel efficiently? Do you know whether you should make all your power or buy all of it, or some combination of the two? Does your accounting department prorate power plant services equally among departments? If so, do you know whether a given depart-

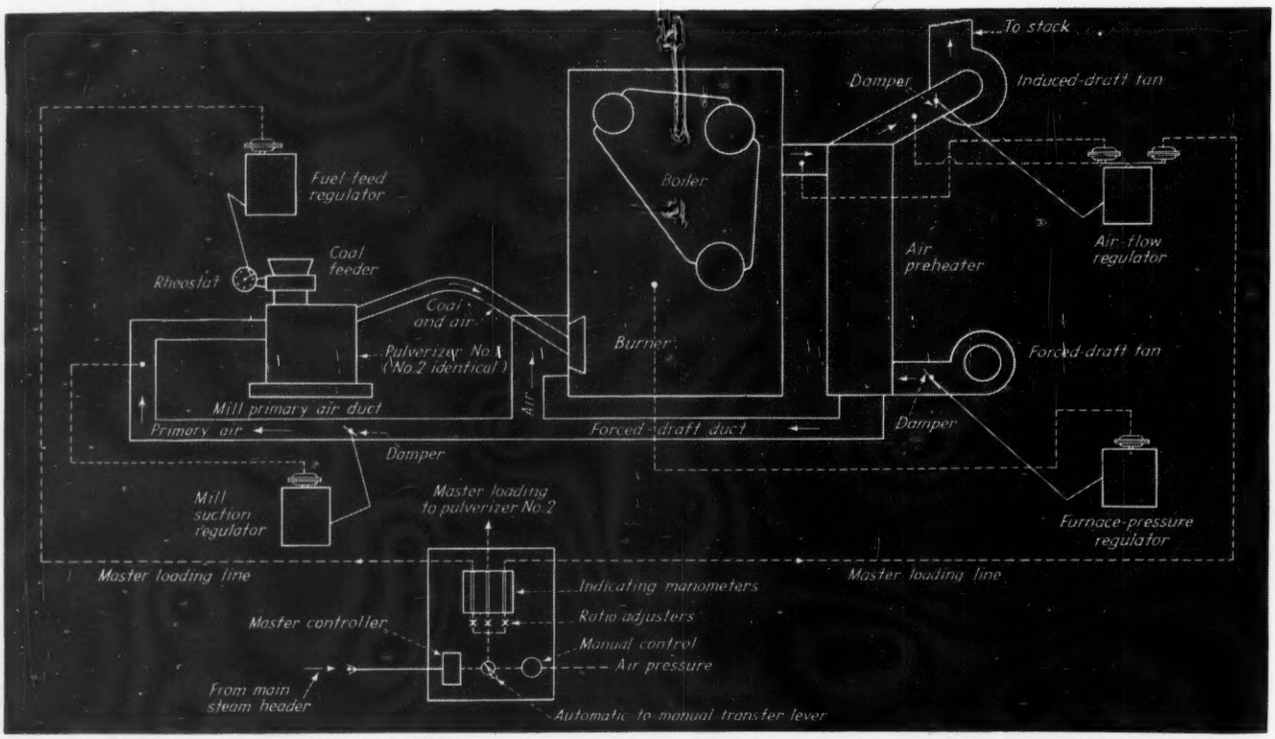
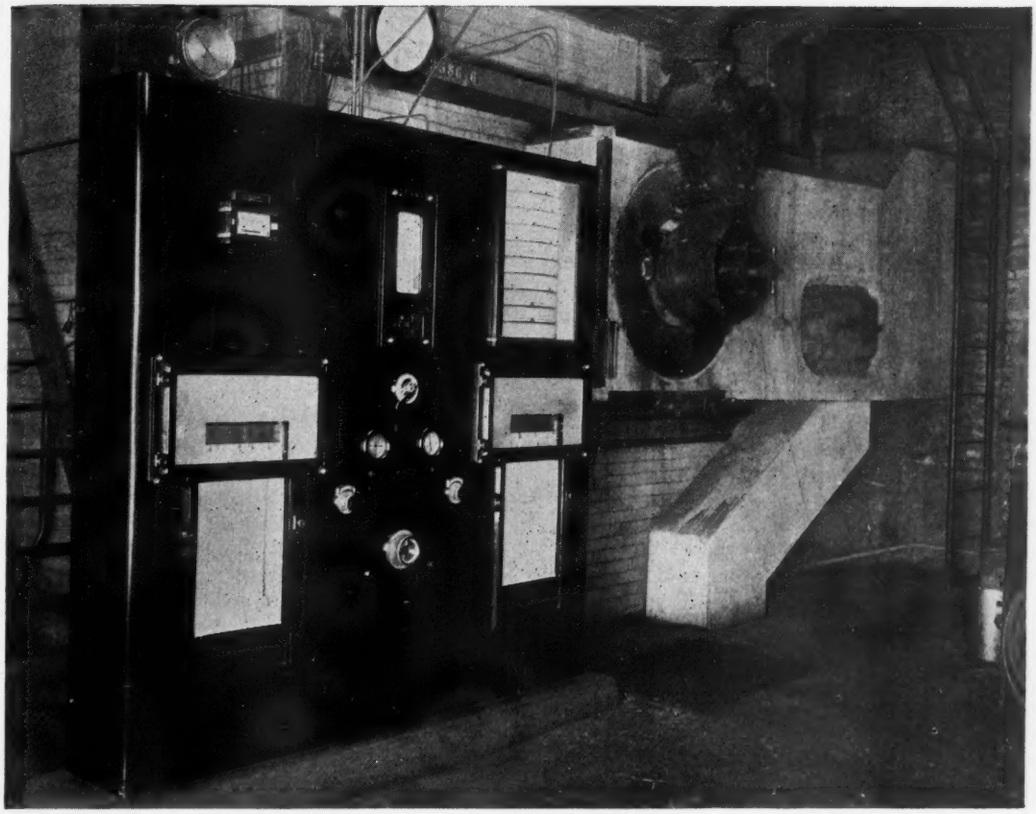


Fig. 1—System for controlling combustion of pulverized-coal-fired boiler to get high efficiency and cut operating costs. This is installed in a well known food plant. Dotted lines show master loading and control connections to regulators.



Typical boiler control and instrument panel giving centralized automatic regulation of boilers in a food plant.

ment is being charged for more steam and power than it uses or for less, resulting in a false unit cost?

The correct fuel for a given food plant is the fuel that makes the cheapest steam. To determine this, first, obtain from sources of supply tabulations on cost per million B.t.u. delivered of the coals available to the plant. This, however, is only an indicator and must be used with care. Next, study the various coals in regard to such factors as: ability to carry the load, above all others the important characteristic; responsiveness to load changes (some coals are slow burners, other flashy); adaptability to present firing equipment; cost of 1,000 lb. of steam, including fuel, labor, ash disposal, maintenance; storage properties; action in combustion equipment and furnaces; reliability of supply; uniformity of quality.

After such an analysis has reduced the choice to three or four coals, each should be tested for 30 to 60 days in the plant under actual operating conditions. That is the only coal test worth making. Similar analysis should then be made of gas, oil or other available fuels.

To show the effects all the above factors, in one plant a $3.60 per ton, 12,500 B.t.u. coal gave a fuel cost per 1,000 lb. steam of 20 cents. But a $3.15 coal, 10,500 B.t.u., increased the cost to 20.70 cents. With proper equipment, another plant saved $16,000 a year by changing from an expensive to a cheaper coal. In still another plant a change from gas to coal burned under new boilers has cut the fuel bill an equivalent of 1,000 tons a month. Replacing of coal from many sources by coal from a single, reliable source saved one large plant $40,000 the first year. In some cases, gas fuel or oil is obtained in competition with coal on an equal steam-cost basis.

Turning now to the boilers, are they in good operating condition and able to carry the load easily and with reliability? If they are twenty years old, they probably have an overall efficiency of 55 or 60 per cent, compared with the 75 to 85 per cent of modern boilers. They must be analyzed in connection with the fuel and combustion equipment. Before such an analysis can be made, you must know the present condition. If you now weigh coal and meter feedwater or steam produced, you at least know your evaporation. Average evaporation in food plant boilers is about 6 to 8 lb. of water per pound of coal. Ten to 12 lb. should be evaporated by a modern boiler and good combustion equipment. In a good modern plant, fuel cost should not exceed 25 cents per 1,000 lb. of steam. In some, the cost is as low as 20 cents.

If you have a number of old boilers, that alone may be a source of inefficiency. One modern boiler in a food plant replaces five old ones, makes more steam at half the cost and operates automatically. But perhaps the old boilers, remodeled and with improved firing methods, will yield a profit. Checking existing boiler output with flow meters will help decide whether you need new boilers. In some instances, these meters prevent buying new boilers too small. In other cases, they show how process schedules can be rearranged to smooth out peaks, so that existing boilers can carry the load easily.

Such instruments as CO_2 analyzers for checking combustion conditions and pyrometers or thermometers for detecting high flue gas temperatures will reveal the condition of the existing boilers. Analysis of ash or comparison of coal and ash weights will reveal unburned fuel losses.

If boilers are hand fired, the firing procedure, methods of cleaning fires and efficiency of combustion must be carefully watched. With stokers and pulverized coal, the same is true, but the equipment does more of the physical work. With coal and ash handling equipment, automatic combustion controls and water level regulators added, repetitive routine adjustments by the operator are practically eliminated and he is raised to his true function, a supervisor of a compli-

cated chemical process, which can then be carried on at test efficiencies over long periods, regardless of variations.

IF your process steam demands are irregular, the overall efficiency of your boiler plant is affected, for the boiler plant is "swinging" all the time, an uneconomical condition. In case your flow meter check-up shows that the process steam load cannot be smoothed out, one way of smoothing out the boiler load so that you can run your boiler plant continuously at constant load and best economy point is to store steam in an accumulator when process demands are low, the entire process being governed automatically.

After spending 25, 35 or 50 cents to generate 1,000 lb. of steam, do you allow 25 per cent of it to waste away at leaky joints or through uncovered piping? Every cent saved here goes into net profits. How about the capacity of your pipe lines? Check up, too, on your boiler feed and process water. Heat at low levels from several sources that cannot generate power can still heat feedwater. Such heat might otherwise be wasted. Proper treatment of boiler feedwater is important for two reasons: (1) to prevent damage to the boilers themselves from scale and embrittlement, the scale also acting to reduce efficiency of heat absorption, sometimes causing fuel losses of as much as 10 per cent; (2) to prevent carryover of dirt and scale formations into piping, valves, turbines, engines, pumps —often a serious problem. Any water, no matter how bad, can be treated by some physical or chemical method, or both, to produce satisfactory boiler feed or process water.

Efficiency of boiler feedwater heaters, water softeners, filters, piping and valves, boiler feed pumps and other auxiliaries will be materially increased by proper boiler water level regulators and combustion controls, and by proper operating and maintenance schedules.

If your plant requires much refrigeration, do you know whether you are obtaining it in the best way? You have two general methods: (1) operate refrigerating compressors in a central power plant, refrigerate brine and pump it to the required locations in the plant; (2) make or buy the required amount of electric power or steam and distribute them in the plant to smaller motor-driven or steam-driven compressors located where refrigeration is needed.

HAVE you ever given thought to the use of exhaust steam for producing refrigeration in an absorption type refrigerating system? A packing company recently installed a new high speed reciprocating 250-kw. steam-engine-driven generator set exhausting at 5 lb. pressure to a 100-ton absorption machine. On this change alone the company places its steam and power savings in the neighborhood of $160 a week, power being generated as a byproduct of refrigerating demand. Another plant saves $410 a month in steam and power with a similar hookup of a 125-kw. engine generator, the exhaust going to a 100-ton absorption machine, water heating, cooking and the like. If you need refrigeration at two different temperatures, do you know of the possibilities of two-stage compressors? Have you compared the modern, high-speed vertical refrigerating compressor with old fashioned low-speed designs? Are your refrigerating compressors driven in the most economical way? How about your water supply for refrigerating condensers and the like?

You have now reached the point of considering how best to obtain the electric power you need. First of all, should you buy your electric power or make it as byproduct of your steam demand? Economies in generating both steam and power should be considered together. For example, if your analysis of the boiler plant shows it in poor condition you have the alternatives of remodeling old equipment or of adding new equipment, keeping some of the old for standby. In such a case, you will be well advised to install high pressure boilers, generating steam at 400 to 600 lb. If you do that, you can install steam engines or turbo-generators that will act as pressure reducing valves and at the same time make power.

Even if high-pressure boilers are not installed because old boilers are still in good condition, condensing turbogenerators from which steam can be extracted for processing may be employed. One packing company, by this method, earned 35 per cent on its investment.

IN case the existing plant contains low-pressure generating equipment still in good condition and more power is needed, a superposition or topping plant may meet the demands. In such a plant, a high pressure boiler (or boilers) and turbine are installed, the topping turbine exhausting to the low pressure turbines and acting as a reducing valve. With this arrangement, the efficient high pressure boiler makes all the steam, the low pressure boilers being held for standby. A certain food plant, using the above plan, is making a saving of $80,000 annually on a $97,000 investment in its power plant, even though the old plant, with low cost purchased power, and boilers in good condition, could still have carried the load. Costs of buildings for the new equipment must be considered but in most cases these will be small. If modern high pressure equipment is to be installed, it is so compact that removal of old equipment often makes room for new equipment of far greater capacity. In one food plant, for example, a 100,000 lb. per hour 600 lb. pulverized-coal fired boiler occupies the space from which five old boilers, of a total capacity of only 40,000 lb. per hour, were removed.

It may be possible to buy all steam, holding existing low-pressure boilers for standby. This is done by a food

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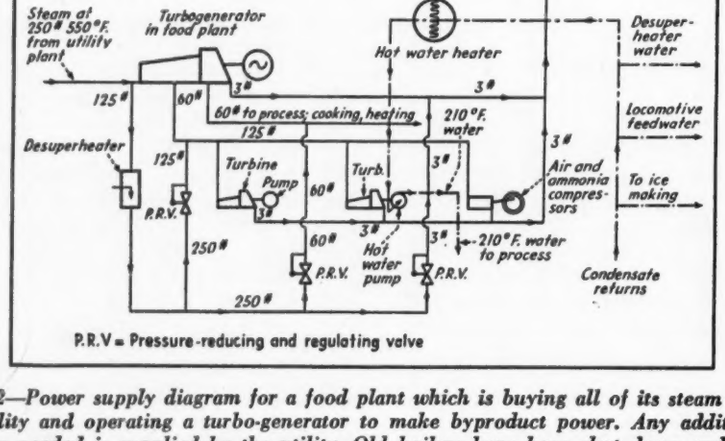


Fig. 2—Power supply diagram for a food plant which is buying all of its steam from a utility and operating a turbo-generator to make byproduct power. Any additional power needed is supplied by the utility. Old boilers have been shut down and held for standby. Note how different steam pressures are obtained for different purposes.

Here Are Ways To Wash Bottles Clean *At Low Cost*

Tests show times, temperatures and solutions to use and which compounds give bests results

By C. RICHARD ARNOLD[1] *and* **MAX LEVINE**[1]

Technical Service, American Bottlers of Carbonated Beverages, Washington.

Professor in Charge, ABCB Research Fellowship, Iowa State College.

THE BASIS of satisfactory washing compounds has generally been recognized to consist of sodium hydroxide (caustic soda) to which are added various milder alkalies. Of the latter, among the more important are sodium carbonate, or soda ash, trisodium phosphate, and more recently, sodium metasilicate. The concentration of these auxiliary milder alkalies which may be employed varies for the different alkalies. Thus a washing compound containing 20 to 40 per cent of sodium carbonate or phosphate by weight calculated as NaOH may be successfully employed. But when silicates are used their concentration must be restricted to less than 12 to 15 per cent. Mechanical difficulties in machine operation arise when silicates are present in too high concentration.

The ABCB recommendation for bottle washing stipulates the following minimum requirements: "Unclean bottles shall be exposed to a 3 per cent alkali solution, of which not less than 60 per cent is caustic (sodium hydroxide) for a period of not less than five minutes at a temperature of not less than 130 deg. F., or an equivalent cleansing and sterilizing process."

It should be noted that these stipulations for temperature, concentration and holding time are suggested as minimum requirements. The relative concentration of caustic in the soaker solution compound is also stated as a minimum. Higher concentrations of caustic may be used as additional factors of safety. The question arises, however, as to how an "equivalent sterilizing process" may be established.

It has been repeatedly stated by the manufacturers of bottle washing compounds that the addition of the milder alkalies, such as sodium carbonate, trisodium phosphate or the silicates, are essential to improve the cleansing properties of the soaker solution. Sometimes the claim is also made that these compounds assist in rinsing. The germicidal properties are better known. The investigations of the ABCB Fellowship have demonstrated very clearly that the addition of these milder alkalies (sodium carbonate and trisodium phosphate, etc.) to caustic increases the germicidal properties of the latter quite materially. In other words, when a mixture of caustic soda and one or more of these milder alkalies is employed, the time to kill the yeast and other organisms present is distinctly reduced over what would be the case if caustic alone were used. Or, to put it another way, the time to kill the organisms is reduced just as would occur if a higher concentration of caustic were employed.

In the bottle washing solution recommended above, it was stipulated that 3 per cent alkali, of which not less than 60 per cent is caustic soda, should be employed. Thus the standard recommends 1.8 per cent caustic to which is added an additional 1.2 per cent of other alkali calculated as NaOH. To what extent has the addition of this other alkali increased the germicidal properties of the mixture? What concentration of caustic alone would have to be used to obtain the same germicidal efficiency as a mixture of 1.8 per cent caustic plus 1.2 per cent other alkali? From a detailed series of laboratory experiments which have been previously reported at short course meetings and published in the scientific literature, it has been possible to compute mathematically the exact effect of the addition of various amounts of milder alkalies. For the standard in question it was found that if 1.2 per cent sodium carbonate, calculated as sodium hydroxide, is added to 1.8 per cent sodium hydroxide, the germicidal efficiency of the resulting mixture would be the same as if there were present 2.16 per cent of sodium hydroxide alone.

The ABCB recommended standard is essentially, therefore, exposure of the bottles to a solution having the germicidal properties equal to that possessed by a 2.16 per cent sodium

(*Turn to page 235*)

▶ ***Bottle washing requires observance of certain minimum conditions if the containers are to be so cleaned and sterilized as to preserve the original quality of the product. Giving specific data on times, temperatures, solutions and washing compounds, this article is of practical value to***

Beverage Bottlers
Milk Plant Operators
Brewers

Table I — Germicidal Equivalents Based on ABCB Specifications for Beverage Bottles

Temp. (deg. F.) Holding time (minutes)	110	120	130	140	150	160
	Concentration of NaOH (per cent)					
1.	11.8	7.9	5.3	3.5	2.4	1.6
3.	6.4	4.3	2.9	1.9	1.3	0.9
5.	4.8	3.2	**2.16**	1.4	1.0	0.6
7.	4.0	2.7	1.8	1.2	0.8	0.5
9.	3.5	2.3	1.6	1.0	0.7	0.5
11.	3.1	2.1	1.4	0.9	0.6	0.4
13.	2.8	1.9	1.3	0.8	0.6	0.4
15.	2.6	1.7	1.2	0.8	0.5	0.3

Table II—Relative Germicidal Efficiency of Some Alkali Bottle Washing Compounds

Washing compound	Concentration required to kill *Staph. aureus* in 10 minutes at 98.6 deg. F.	Time required to kill 99.9 per cent *Staph. aureus* by 1 per cent of compound at 98.6 deg. F.	Time required to kill 99.9 per cent *B. mesiens* by 2 per cent of compound at 140 deg. F.
I	3.7 per cent	15 min.	35 min.
II	2.2 per cent	7 min.	25 min.
III	3.3 per cent	6.5 min.	22.5 min.
IV	8.5 per cent	.....	.....
Caustic (NaOH)	1.5 per cent	2.5 min.	8.0 min.

More Mistakes To Avoid in Packaging

PART II

EDITOR'S NOTE: ***This series will run for several months until it is completed.***

EVERY EXAMPLE is based on actual errors of packaging. Publication of the negative aspects of packaging is frequently more informative than the mere statement of a bunch of rules to follow. Particularly is it important to bring out the reasons why, and the automatic penalties that develop because of making mistakes.

115 **Failure to Make Test Shipments**—Before adopting a new package, or switching over to new packaging materials, test shipments should be made to the sales territory and then returned unopened to the factory for inspection. This is to ascertain any damage that may occur after the package has left the factory.

116 **Hot Product Affected Waxed Paper**—A midwestern baker bought some wet-waxed wrapping paper at what appeared to be a bargain price. It was used to wrap cartons of crackers. Its performance for that purpose was not good. It had very poor sealing properties and a high percentage of the cartons had to be returned for re-wrapping. The number of rewraps was particularly large when the cartons had been packed with crackers still warm with oven heat. Also packages on which this waxed paper was used quickly and easily became soiled and finger smudged during handling.

The wax on the paper had a softening point slightly above 100 deg. F. and a melting point of 115 deg. F.

Troubles encountered through the use of this "bargain price" waxed paper are avoided by the use of a waxed paper carrying a wax having a melting point of at least as high as 130 deg. F.

117 **Inserting Bung Crossways**—One of the frequent mistakes made in packing wooden barrels is that the bung is not put into the bung hole with the grain of the bung running with the grain of the bung stave. This is a very particular and important operation, and in many cases where the bung has been put in wrong, it splits the bung stave and causes leakage.

118 **"Doping" Adhesive Ruined Product**—A cereal product was packed in a carton which was then tight-wrapped with a printed label glued to all sides. That package was satisfactory. Then, a new rubber-lacquer surfaced paper was used for these labels to give added moisture protection, and to produce a brighter, more easily cleaned exterior. It was found that the glue in use would not adhere to the folds where two coated paper surfaces came together. It was suggested that benzine or carbon tetra-chloride be added to the glue to cut the rubber lacquer and obtain adhesion. This was done and excellent gluing resulted. Unfortunately, the chemical odors of the solvent penetrated through the carton and were absorbed by the product, thereby ruining it.

This packaging mistake is an example of the danger of making even a small and apparently unimportant change in procedure without investigating all possible effects on the product.

119 **Improper Container Storage**—Most containers are subject to some form of deterioration after prolonged storage. A very common mistake made by packers of foods is to store the empty containers in such a manner that the most recently received containers are the first ones to be used. Proper arrangement of the storage warehouse would, in most cases, prevent this form of trouble.

120 **See Your Doctor Twice a Year**—Many large users of paperboard packages attempt to solve their own packaging problems. Or else leave it to be done by the shipping clerk. One of the latter claimed that his *six year's experience* in packaging made outside help unnecessary!

It was demonstrated, however, that a manufacturer of containers who had had more than twelve times that experience was able to show the shipper how to make a number of money-saving changes. Many who have had such surveys ask to have them repeated every six or twelve months, and regard this in the same light as a periodic check up on one's health by his physician.

121 **Adequate Test Runs Needed**—In adopting a new size of bottle or can, the manufacturer may fail to run a sufficient number through his production machinery before ordering in quantity. With bottles it is frequent to find trouble in the bottle washer due to something that does not work exactly right. A check up with the machinery manufacturer should always be made, but there is no good substitute for actually running the bottles through the washer.

122 **Incomplete Specifications**—In one of our operations a cotton thread is used. Purchasing specifications call for a rigid inspection of the size of thread, the number of strands, and the method of twisting, size of spool, etc. Deliveries have been made in accordance with those specification for years with no trouble whatsoever. Then due to flood conditions it was necessary to change the source of supply.

It so happens that the machines on which this thread is used are constructed so that a knot in the thread will cause the machine to become jammed. Usually it takes about

fifteen minutes to get them back into operation if an unnoticed knot goes through.

When the new supply of thread came in, we discovered too late that each spool had several knots. The delays and difficulties caused by such knots made it almost impossible for us to use the thread. Here was a case where our specifications were incomplete, simply because we did not realize that any manufacturer of thread would supply us with other than a spool free of knots.

123 **Bought Bags Too Cheaply**—A small food manufacturer decided he was paying entirely too much for the transparent bags he was using to pack coconut-covered cookies. He then proceeded to buy bags at the cheapest possible cost, regardless of source. Strangely enough, he then began to have complaints from the field that the product had a very bad taste.

An examination showed that the bag-maker, in his haste to produce these bags with lowest possible cost, was very careless of the amount of adhesive used in the seam and bottom closure, and also in the type of solvent. The result was that the bags carried a large amount of solvent, the odor of which was absorbed by the product.

124 **Overfilling Made Caps Come Off**—Difficulties were experienced with a pack of ripe olives, through caps coming off during processing. These caps were apparently seated firmly and thoroughly capable of maintaining vacuum. They also seemed to have enough holding power, but nevertheless came off in the retort process. It developed that insufficient headspace had been allowed in filling the containers. An internal pressure of 75 lb. per sq.in. was being developed in the retorting, because of expansion of the liquid and consequent compression of the air left in the headspace after sealing. An increase of 1 per cent in the headspace reduced this internal pressure to a figure where the counterbalancing pressure in the retort kept the caps in place.

125 **Strong Smelling Ink Caused Odor**—A shipment of newly designed and freshly printed cartons was rushed to a baking plant so that a planned sales campaign could get under way on scheduled date.

All the cookies packed in the new cartons were returned because of a strong objectionable odor and flavor. Investigation revealed that a fast drying, but strong smelling, ink had been used on the cartons; also that so little time had elapsed between the printing and the packing operations that the ink odor had not been dissipated; and that the contents of the cartons had taken up enough of the odor to make them inedible.

126 **Lack of "Surge Points"**—In an effort to conserve space, a mistake is frequently made in placing machines too close to each other. When such machines are operating at high speed, they should be spaced so that there is 10 to 12 ft. of conveyor between each two machines. This conveyor serves the useful purpose of providing an accumulation space, or "surge point," so that when one machine in the line is momentarily stopped for any purpose, it is not necessary to stop other machines in the line. Also, this spacing provides an opportunity to compensate for the inevitable variations in speed of the several units of equipment. A good rule is: The faster the equipment, the greater should be the space between each two machines.

This rule is illustrated by the experience of a maker of food specialties in the East. This manufacturer used machines intended to run at an average speed of 80 containers per minute. In an attempt to save space, the machines were placed with less than 5 ft. of space between. As a result, any stoppage caused the bottles to pile up on the intake conveyors and smash. Until the condition could be corrected by increasing this spacing, it was necessary to employ additional operators on the line, to take bottles off of the conveyors in case of stoppage, and to permit the other machines in the line to operate by hand feeding.

127 **Increased Speed Caused Swells**—A coffee packer installed a new machine for closing cans of coffee under vacuum. This machine operated at three times the speed of his original closing machine. This great increase in speed naturally shortened the time elapsed between grinding the coffee and packaging it. In turn, this resulted in higher pressures in the filled can because the carbon dioxide normally formed in freshly roasted coffee did not have time to partially escape. A further result of this combination of circumstances was development of many badly swelled cans.

Proper consideration of the packaging problem as a whole and consultation with the supplier of his cans, would have avoided all of the trouble.

128 **Wrong System of Ordering**—Measuring last year's wrapper, bag or package, is sometimes dangerous. Here is how it works out. A manufacturer had an item that could be produced in large quantities at one particular time of the year. For packaging, he used one of many kinds of printed transparent wrappers. In as much as they ordered these wrappers only once a year, when the time to re-order arrived, the person who did the purchasing measured an old wrapper and sent in the order. The wrapper was used successfully during the second year. However, the third year it did not work out so well.

The purchasing man had done the same thing, but the result was that considerable trouble with wrappers developed. They were too small to fit the product. The wrapper had shrunk a little, causing the trouble.

The mistake made here was in not referring to their purchasing records to get the correct size of wrapper as they should have done.

129 **Stored Liners Too Hot**—In order to give his product maximum protection, a manufacturer of food products lined his boxes on automatic lining machines. The liner consisting of vegetable parchment paper, was supplied in rolls. These rolls were stored near a radiator and the heat caused the lining paper to curl so that it was difficult to handle on automatic equipment.

The paper was then stored in a room where the temperature was below 60 deg. F. and the difficulty was eliminated.

Practically all types of lining papers have a tendency to take the curl of the roll when subjected to heat. To keep lining paper in proper condition it should be kept in a cool place.

(To be continued)

Food Packages Win

"Grape Gold" wine bottle

Eleven hundred of the nation's packages were entered in this year's competition for the Wolf Award. Among them were many food product packages. There was a slight increase in the total entrants this year as compared to last year. However, the entries of food products packages in the various competitions increased approximately 25 per cent this year over last year. One-third of the first awards were given to food product packages. Honorable mention was given five food companies' packages.

AWARD for the most effective use of layout and decorative design with particular emphasis on both merchandising value and beauty was given to "Grape Gold Wine Bottles," product of Quality Wine Co. The appearance of this package, though simple, catches the eye. The label consists of a single gold stripe down the front of the tall bottle with a small circle below the half way mark. The neck and top of the bottle is capped in white.

THE AWARD for the most effective use of merchandising ingenuity regardless of artistic quality, was given to the "Holsum Pantry Package" entered by Capendick Bakery Co. This package consists of two half loaves of bread separately wrapped in wax paper, inclosed in an outer wax paper wrap to form a single loaf. A line on the outer wrap, indicated by directions, informs the housewife where to cut between the two half loaves. The purpose of this ingenious package is to preserve the freshness in one of the half loaves while the other is being consumed.

THE AWARD for the most effective use of the elements of design to create shelf visibility in a retail store, was given to Freshway Coffee bags, entered by National Brands Sales Corporation. This coffee sack is deep red with a band of black near the bottom.

Food DISTRIBUTION

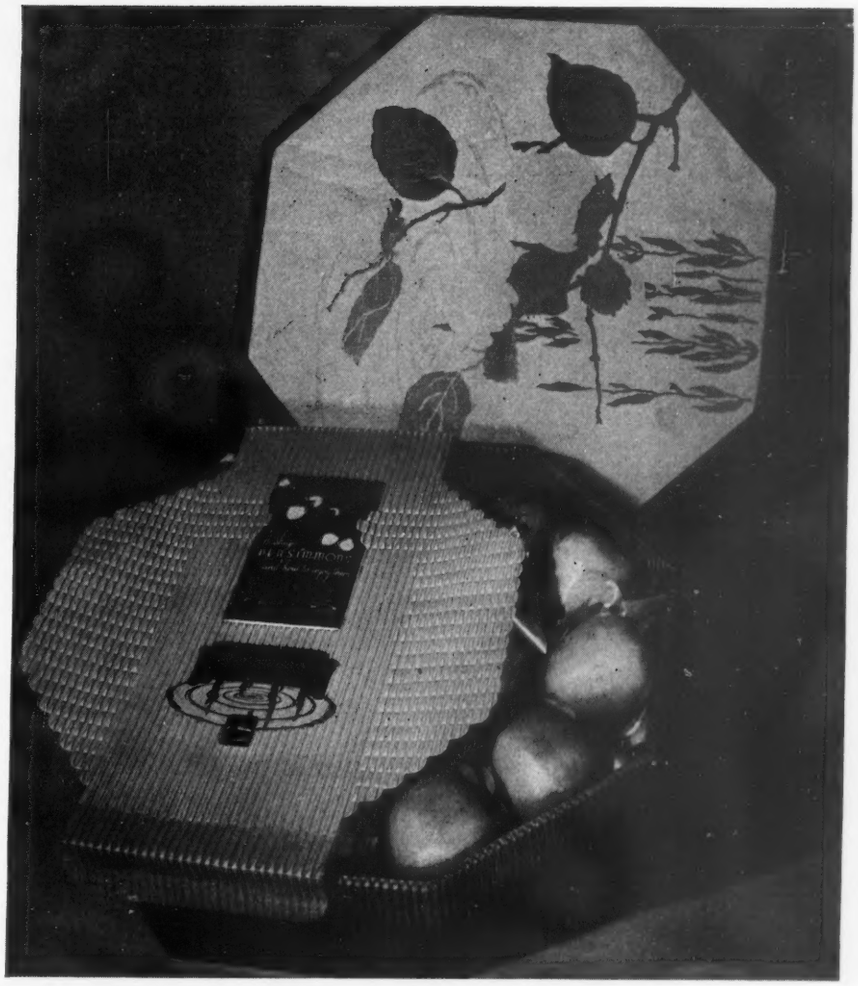
"Holsum Pantry Package" for bread

Awards

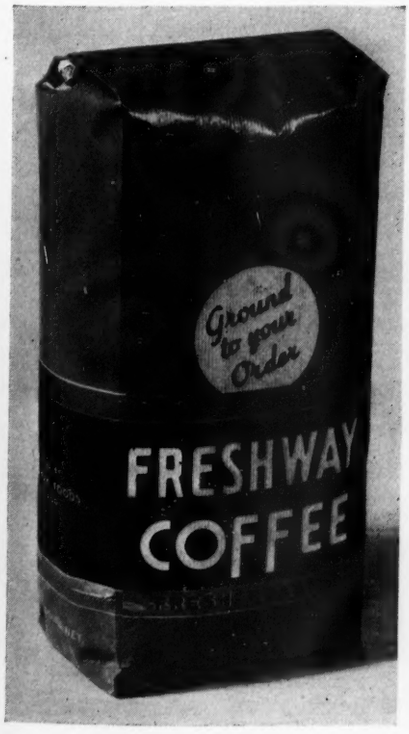
The package is simple in design and, as viewed on the shelf, shows the minimum amount of typography, most of it legible from the consumer's side of the counter.

OLD-FASHIONED cider apple butter jar entered by the J. M. Smucker Co., received the award for the most effective redesigned package. The redesigned jar is round—the former jar was oval. The original container was tall, the redesigned container is more squat. The label on the original container occupied but a small portion of the large surface of the jar, the new label occupies a much larger space, more than half. The new label is designed to carry across the idea of "old-fashioned." The use of scrips and scrolls is extended to the cap which in the former design was plain.

THE shipping gift box for fresh Hachiya persimmons was given the award for the most effective package designed to promote the product as a gift. This package was entered by Stillwater Orchards Co. Another first award was given to this company for



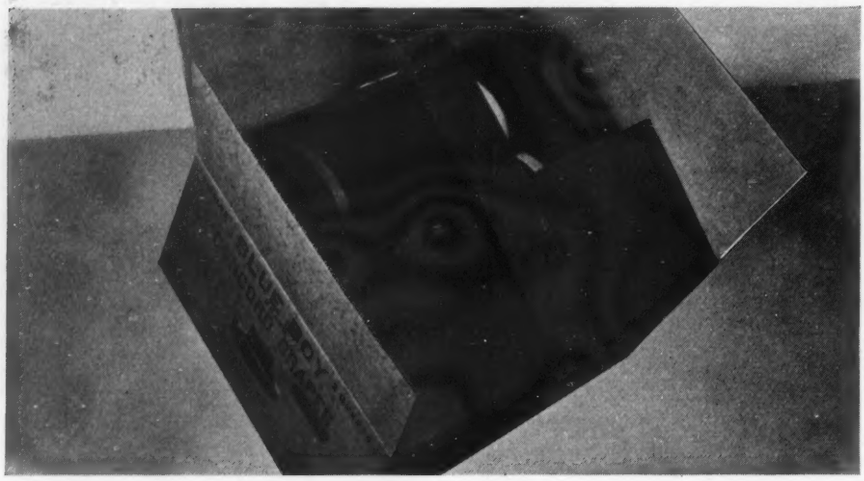
Gift shipping box for "Hachiya" persimmons



"Freshway" coffee bag

New and old jars for Smucker's apple butter

Four food colors come in one package



Shipping container for perishable fruit

standpoint of merchandising and construction ingenuity, regardless of artistic quality.

JOSEPH BURNETT'S Co.'s "Burnett Liquid Color Package" received honorable mention for effective use of merchandising ingenuity regardless of artistic qualities. Four food color bottles are packaged in a folding carton with cut-out windows at the level of the bottle closure. These closures are of the same color as the food coloring in the bottle. These consumer packages come packed in a counter display from which they can be removed by the consumer.

HONORABLE MENTION was given to "Canada" mint display box, entered by New England Confectionery Co., as an effective redesigned package. The 120 count display box contains a separate transparent display box containing 24 count. Stock in this small display container, which takes up but little counter space, is replaced as it moves from the larger 120 count container.

ALBERT MILLER & Co's potato bag received honorable mention for effective use of merchandising ingenuity regardless of artistic quality.

Food DISTRIBUTION

the most effective package insert. The fresh persimmons gift shipping box obtains an artistic effect from the use of protective packaging material—corrugated paper. The octagonal package has a pleasing and artistically designed cover and an equally attractive interior when the cover is removed. The package does create the desire to give.

G. W. HAXTON & SONS Co.'s shipping container for perishable fruits was awarded for the most effective use of inventive genius in package construction. This corrugated box shipping container holds twelve 2-qt. paper baskets for grapes. The container is closed by a corrugated strip over the top of the container, which fits into slots at the outer edge of the top surfaces and is held in place by notches.

Another G. W. Haxton & Son Co. shipping container for perishable fruits also received honorable mention as an effective shipping container from the

Display for "Canada" mints

Merchandising Hints

AND HURDLES

Free Deals on Paid Basis

THE INDEPENDENT RETAILERS and most of the wholesalers have long opposed loss leader selling. Failing in all other attempts to end this practice, they supported fair trade laws in the various states. But the fair trade laws have not solved the loss leader problem. A few food manufacturers have placed a price floor under some of their foods but there has been little attempt to take advantage of the "privilege" of price-fixing in those states where it is legal. Loss leader selling is not yet outlawed.

Another pet peeve of the wholesalers is the cost most of them absorb when they handle free goods on deals. One group of wholesalers has found a satisfactory way to solve this problem, a method more workable than getting favorable laws passed. This Illinois association, the Associated Grocery Industries Council, Inc., has been adamant that free deals must be withheld in the Chicago area or the jobber must be paid for handling free goods at the same rate as for merchandise regularly sold.

Several food manufacturers have acceded to the demands of this group and now General Mills, at present promoting Corn-Kix at 1 cent with every purchase of two packages of Wheaties, is paying the direct buyer 4 cents a case for handling the Corn-Kix.

There is a nation-wide implication in the move of General Mills to compensate jobbers for handling free deals. This may become a precedent not confined to the Chicago association.

Where is This Infant Going?

FROM THE Agricultural Club of Chicago comes the statement that there are now 3,200 cold storage locker systems in operation throughout the country. Approximately 1,300,000 lockers are rented to more than a million families. About half of these installations are cooperative enterprises for the benefit of users and managed by a salaried employee. The remaining 50 per cent of the locker plants are operated as profit enterprises, the profit coming from brokerage and services.

Manufacturers pay distributors' costs of handling deals.

A number of the state universities, including Wisconsin, Minnesota, Illinois and Purdue, have been guiding the activities of locker plants and locker plant patrons in their respective states. As the result of the encouragement of state and federal governments and universities, it is predicted that at least 25,000 locker plants will be put into operation in the next five or six years.

It will require between a fourth and a third of our families to support 25,000 locker plants. The retail food equivalent of the present locker plant output is somewhere around $300,000,000. A proportionate increase would bring the 25,000 locker plants output to around $2,500,000,000.

The retail equivalent of the food consumed from the average locker plant each year is equal to that sold by the average chain store. It is true that not all of the food stored in the locker plant replaces food which would have been bought at retail. However, for the purpose of gaging the scope of the locker plant system, it is not too gross an exaggeration to estimate that the average locker plant replaces the sales of the average chain unit.

The locker plant system may be more effective in uprooting and replacing retail food stores, whether chain or independent, than state chain store taxes or other legislation.

Home Storage for Frozen Foods

A NUMBER of the manufacturers of domestic refrigerators are anticipating the expansion of the frozen food industry. Some have well-developed plans for incorporating a frozen food compartment in their domestic refrigerator, others actually have placed

Food manufacturers will welcome the advances in the new domestic refrigerator models, with compartments for holding ice cream and frozen foods.

on the market domestic refrigerators containing a compartment for the storage of frozen foods. Among those who have placed on the market models with frozen food compartments, is Nash Kelvinator with its 1939 Model Leonards. This new design of Leonard "Zero-Freezer" offers below freezing storage space for packages of ice cream or frozen foods.

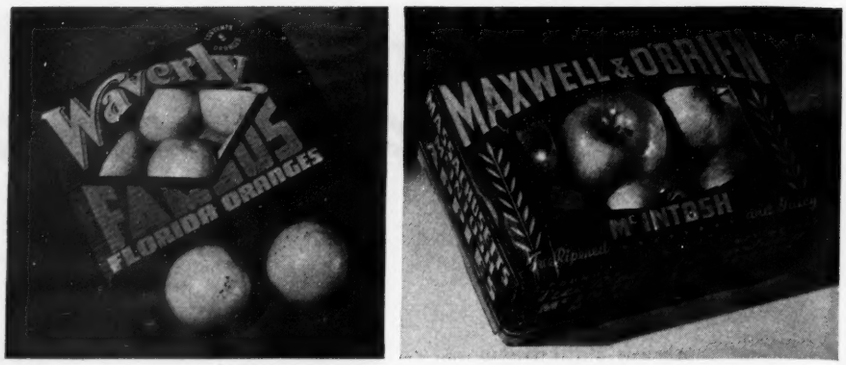
Salesmen to Replace Clerks

THE NATIONAL GROCERS INSTITUTE plans to offer educational courses to those interested in graduating from

grocery clerks into salesmen. Six full courses will eventually be offered. The clerks completing the courses will become master grocers.

So far about 3,000 have enrolled in the courses which will some day merit them a diploma and title of "Master Grocer."

The elementary lessons will be devoted largely to teaching the origin of the principal food commodities handled in the grocery store. Advance courses will teach the fundamentals of food processing and the technique of salesmanship. This educational plan should be welcomed especially by those food manufacturers producing quality foods.



The pressure of frozen food competition has stimulated a general trend toward the prepackaging of fruits and vegetables for the consumer.

Packaging Tempo Set by Frozen Foods

HARRY CARLTON, merchandising investigator, University of Tennessee, in an address before the Packaging Conference of American Management Association, indicated that costs of frozen foods to the consumer must be reduced if frozen foods are to continue to meet the competition of other foods. He pointed out the improved methods of packing and packaging fresh fruits and vegetables not only for the market, but for the kitchen, stressing the fact that neither the fresh produce industry nor the canning industry would face the competition of frozen foods "lying down."

One way to reduce the cost of frozen foods to the consumer is by better and less costly packaging. Mr. Carlton pointed out that the canners supply canned fruits and vegetables to the institutional trade in No. 10 cans, a single standard container, while the frozen food industry packs these same items in twelve different sizes of containers for the same institutional trade. Standardization of packages is, therefore, one of the next necessary steps ahead for the frozen food industry.

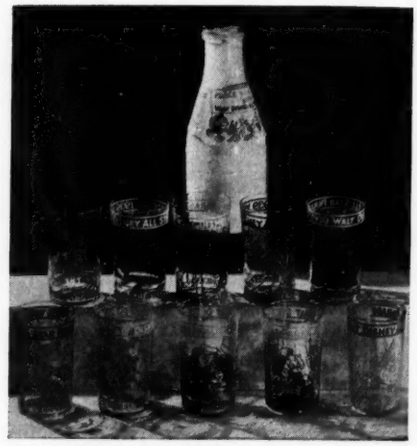
As a result of competition of frozen foods with other foods, many of the food industries will not only improve their products and their processes, but also their packages. Many products not heretofore packaged will bid for a place in ths consumer's market basket in package form.

Jersey Super-Market Tax Illegal

A DECISION by a New Jersey court nullified the ordinances of Camden and Atlantic City which ordinances placed an annual levee of $10,000 and $5,000 respectively on supermarkets. The court ruled that a municipality "may not require its residents to forego the exercise of an economy in order that a group of merchants unwilling to take advantage of economy and management may prosper." The tax levied by these two New Jersey municipalities was levied against those food stores permitting their customers to wait on themselves. The court ruled that a municipality "cannot arbitrarily discriminate between those engaged in the same business merely because one merchant chooses one method for making sales and another fails to do so."

Milk in Progress Parade

BOTTLED MILK with a colorful collar special for the occasion and a special premium offer marches in the "Parade of Progress." Sheffield Farms Co., Inc., New York City, is using the Parade of Progress as a special occasion for a special premium offer of cottage cheese packaged in a different Walt Disney character glass each week for ten weeks. A colored collar on home delivered bottled milk announces the Parade offer.



Sheffield Farms Co. joins the Parade of Progress.

Everybody Satisfied?

WHATEVER APPREHENSION may have been held by the food manufacturer regarding the method which the Federal Surplus Commodities Corporation would employ for disposing of food surpluses may well be dismissed if the tentative plan is executed.

This plan, which the government feels holds the greatest promise of balancing over-production and under-consumption, proposes to distribute excess food stocks through regular wholesale and retail channels. The plan proposes to subsidize consumers in the lower income brackets whose food budgets are far below normal.

The plan further proposes that all surplus crops shall follow all regular commercial channels of distribution without the interference of artificial control over costs or prices. It is expected that normal competition in handling the additional volume of business will reduce both spread and mark-ups. However, the volume generated by the disposal of surpluses will be in addition to present consumption of food bought at retail outlets. To provide the purchasing power for moving surpluses, the government will provide, to those now receiving some form of federal, state or local relief, an allowance increasing by half their present expenditures for food.

The plan proposes to distribute its allowance to be converted into food supplies in the form of stamps, redeemable only for products periodically designed as surplus by the Department of Agriculture. The stamps, blue in color, will be worth 25 cents each and will be issued to each family in an amount determined by the record to be obtained by relief officers of the family's present outlay for food.

In addition to the allowance the government will make for increased food purchases through the use of blue stamps, the government will also

issue orange stamps in place of the cash which at present is theoretically being spent for food by those on work relief wages or direct relief allowances. These stamps will be redeemable not only for those commodities designated by the Department of Agriculture as surplus commodities but for any product for internal consumption purchasable at food stores, except drugs, liquor, candy and articles normally consumed on the premises. The effect of this restriction is, of course, to confine the government stamp business to grocery stores and food products.

Although the full details of cashing a stamp have not been worked out yet, the plan intends to permit grocers to collect stamps, paste them on cards and use them to pay bills to the wholesalers. They will be redeemable by either retailers or wholesalers at some local government office, possibly the Post Office, a Treasury office or some other disbursing agency. A method is yet to be devised for stores in making change for stamps.

The plan will not go into general use immediately, but will be tested in a few selected localities with typical characteristics. It is expected that any irregularities will be worked out so that the plan may be broadly applied by next winter. The plan will have the blessing of the Department of Agriculture, the Department of Commerce, and trade groups, as well as WPA, the Treasury and Public Health Service, all of which have participated in devising the plan, at least in the preliminary draft form.

Under this plan there is no differentiation between surpluses and foods moving through the regular channels of distribution. Purchases, made as usual by the trade from producers of those commodities which are produced in over-abundance will, however, be purchased in increased quantity to supply the demand created by the allowances to the needy families. The government will not purchase from producers and will in no way participate in the distribution, except to provide the purchasing power. This means that the government, although not the actual purchaser, will pay retail prices instead of prices on the farms. Normal competition is expected to keep prices in line.

This plan, which is intended to aid all those who now benefit directly or indirectly from some form of federal, state or local relief, will pass on food purchasing power in varying amounts to families consisting of at least 22,000,000 people, who will receive the food-purchase stamps when these are ready for distribution. It is possible that the number may be increased by extending the plan to other needy people who are not yet receiving public relief. Approximately 35 to 40 per cent of the pay received by those on relief goes for food for the average family of four. It is estimated that at least $1,144,000,000 is now spent for food by these 22,000,000 people. Increasing the food expenditure by 50 per cent as the plan contemplates, should mean a federal outlay which would increase the retail sales of food by approximately $572,000,000, increasing retail grocery sales by that amount or more and returning a proportionate amount back to producers.

One-third of the wheat flour in this loaf of bread is replaced by flour made from ground vacuum dehydrated apples.

Spotlight on the Vitamins

DRUG STORES during 1938 sold vitamins, the retail value of which was approximately $400,000,000 according to the Kellogg Co., which is attempting to teach grocery retailers to sell vitamins too. Kellogg Co. points out with an illustrated brochure to grocery retailers that all the necessary vitamins for health and well being are available in the average grocery store. The brochure further points out that all these precious vitamins are available quite within the reach of almost every pocketbook. Recently a number of food companies are stressing in their promotion the vitamin content of their products.

Standard Brands is offering to the baking trade a new type of yeast with high vitamin content, which according to the company's promotion makes the Vitamin B content of white bread equal to that of whole wheat bread.

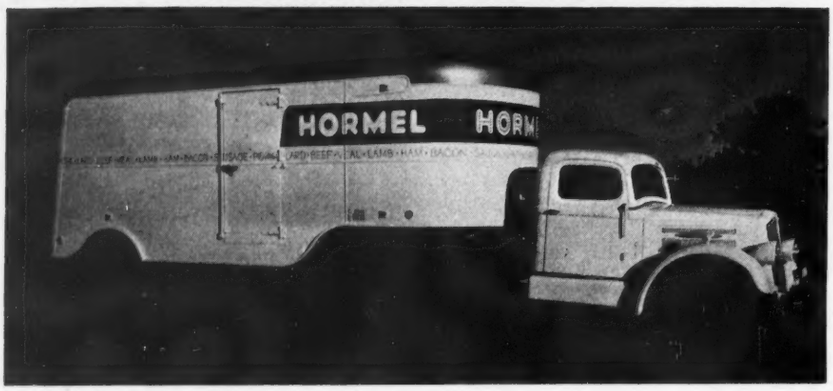
The apple growers of the Northwest are finding a new use for apples, based on the mineral and vitamin content as an ingredient in bread. This product is a flour, the result of milling vacuum dehydrated Winesap apples. The apple flour as used by Hansen Baking Co., Seattle, Wash., in the company's "Olympic Apple Bread," in the equivalent ratio of an apple to a loaf of bread, is not used to produce a fruit flavor in the bread.

The result of replacing a portion of the wheat flour with apple flour is to produce a loaf of bread that is declared to be more tasteful and more healthful because of the increased mineral and vitamin content. Also, because of the presence of a small amount of apple pectin, the bread has greater keeping qualities than the usual white bread loaf. The addition of this apple flour, product of Appelo Apple Corporation, to white bread replaces a portion of the starch with non-fattening material.

Food
DISTRIBUTION

How Motor Vehicles are Being Used

To Improve Public Relations



To insure good public relations, trucks should be clean, neat, well maintained and properly driven, believes Geo. A. Hormel & Co.

IMPROVEMENT in public relations is a current trend in business. And for the food manufacturer, motor vehicles represent an important tool with which to effect this improvement. How this tool may be utilized to best advantage is told on this page by executives in the food field.

Cleanliness is Paramount

THE OUTWARD APPEARANCE of highway trucks unquestionably has a decided effect on public opinion. The first step, then, in insuring positive public opinion is to present trucks on the highway that are clean, neat, well maintained and properly driven.

Color is important in suggesting cleanliness, but even more important than color is actual cleanliness. Color schemes, lettering and general design of body and chassis should, of course, be pleasing to the eye. Safety maintenance of vehicles is a decidedly important factor in public opinion.

Not second in importance but of equal importance with the trucks is the appearance and attitude of the drivers. In order that a truck may present proper appearance on the road it is essential that it be driven by a thoroughly trained and well schooled individual. Drivers should likewise be schooled in courtesy, politeness to customers, pedestrians and the general motoring public. Assistance to unfortunate motorists on the highway in a very large measure contributes to improved public opinion.—R. F. GRAY, *Manager for the Packing Division, Geo. A. Hormel & Co., Austin, Minn.*

Three Points of View

FACTORS affecting the public relations value of motor vehicles are naturally first considered from the angle of the engineer and the advertising man. Thereupon, we asked our field engineer, F. L. Moore, to contribute his ideas, which are as follows:

"The engineer looks at the motor vehicle as a piece of equipment which he must not only maintain and operate on an efficient basis, but as a dangerous weapon which he may be placing in untutored hands. The thoroughness with which brakes and other safety devices are checked will be the measure of his success in contributing to the public welfare when the vehicle is on the road."

Next, R. W. Knox, manager of the Advertising Service Department, was called upon, and he stated:

"The advertising man looks at the motor vehicle as very definitely affecting public relations, and also, through the use of suitable wagon poster equipment, as an important advertising medium.

"Especially for the distribution of foods, the vehicles should be light and clean. A cream color body with black or deep blue running gear and fenders appears to be a good combination, with contrasting lettering when 'copy' is used on the body.

"Equipment that is kept in proper shape certainly makes an impression on the public, consciously or otherwise. Faded paint, jagged fenders, rusty trim or sagging bumpers cannot help but carry the impression of slack operation. The appearance and operation of motor vehicles should sell the public *pride of ownership, courtesy* and *safety.*"

The accountant sees proper equipment carefully operated on the highways as contributing to the increased sale of the products handled by that equipment.—JOHN THIES, *manager, Accounting Service Department, Quality Bakers of America, New York, N. Y.*

Food DISTRIBUTION

Food Technology

NEW DISCOVERIES & INVENTIONS

FOOD TECHNOLOGY

Foods and Technology of Tomorrow

IN AN EFFORT to forecast advances for the next 60 years in food technology, consideration has been given to foremost needs as now felt in the industry. Also to present trends and the lines of progress in the past 60 years.

Spoilage will be enormously lessened by exact study of the three causes (biochemical changes in the material itself, action of micro-organisms, and environment). Specific preservatives will be developed to control biochemical reaction and micro-organisms without detracting from the quality of the product. Optimum environment, with respect to atmosphere, temperature and other influences, will be provided in storage. Chemical and low-temperature preservation will be combined by storing foods in special gas atmospheres which will lower refrigeration costs by permitting higher temperatures than required for foods stored only in air. Even household refrigerators may be equipped to keep foods in an atmosphere of carbon dioxide or nitrogen.

Thanks to highly developed preservation methods, fruits and vegetables will be sold with practically all waste removed. Apples and pears will be peeled and cored, oranges and bananas peeled, peas and beans hulled, etc., and all without loss of freshness or flavor. Valuable by-products will be recovered from the waste matter.

New and strange sources of food products will be called into service, partly to utilize natural resources and partly to meet the demands of special diets as the science of nutrition advances. Optimum diets will be studied according to individual needs, e.g., for brain workers and for laborers. Weeds, wild fruits, algae, seaweed and other sources will provide materials for special diets, and the deficiency diseases will be brought under control.

Digest from "Chemie in Deutschland: Rückblick und Ausblick" ("Chemistry in Germany: Retrospect and Prospect"), by Claus Ungewitter, 1938, 143 pp. (Published in Germany).

BAKERY PRODUCTS

Vitamin Enrichment in Flour

TO INCREASE the vitamin potency of flour, while at the same time improving its keeping quality, a small proportion of ascorbic acid (vitamin C) is added. If preferred, sodium isoascorbate may be employed instead of free ascorbic acid. As the invention is described in French Patent 827,142 (granted April 20, 1938, to N.V. Industrieele Maatschappij voorheen Noury en van der Lande, Deventer, Holland), the active ingredient is introduced on a non-hygroscopic powered carrier such as magnesium carbonate, talc, dicalcium phosphate, starch or infusorial earth. Suitable preparations for vitamin enrichment and preservation of flour include 5 parts ascorbic acid (or sodium isoascorbate) in 95 parts of talc or wheat starch, or 10 parts in 90 parts corn starch, or 1 part free ascorbic acid in 99 parts magnesium carbonate.

What Happens to Sugar in Bread

IMPROVED ANALYTICAL METHODS have made it possible to determine accurately the different sugars remaining in baked bread. Yeast cannot ferment cane sugar without first inverting it to dextrose and levulose. Analysis by the new methods shows that yeast has a distinct preference for dextrose, leaving the levulose unfermented as long as any dextrose is available.

This is important because levulose is exceptionally sweet (three times the sweetening power of dextrose) and hygroscopic (four times the moisture retention power of dextrose). It also caramelizes much more readily than dextrose, thus facilitating the browning of crust and toast. It appears from the new analyses that sufficient cane sugar should be added to provide the yeast with dextrose both in the sponge and dough stages, or about 4 per cent in all. Thus, about 4 per cent levulose would remain. And, since it can retain half its weight in moisture, the weight of saleable bread would be appreciably increased. Since no simple commercial treatment is known for stopping the retrogradation of starch and hardening of gluten, the best way to retard staling is to maintain softness by the shortening and other ingredients, and by the moisture retention of the levulose left after baking. Partially converted starch also contributes to moisture retention.

Digest from "Sugars in Bread," by Whitman Rice, *Cereal Chemistry* 15, 672, 1938.

BEVERAGES

Three Ways for Brewers To Avoid Stream Pollution

BREWERY WASTES are usually discharged into the municipal sewers and treated together with sewage in the sanitary sewage treatment works. A survey conducted by the Sanitary District of Chicago in 1937 revealed that the 28 breweries located within the city limits contribute daily a total flow of 3.5 million gal., containing 18,800 lb. of total suspended solids, 14,300 lb. of which are of organic nature; and a five-day B.O.D. (biological oxygen demand) of 35,000 lb. constituting a "population equivalent" of 210,000. Volume and composition of brewery wastes are compared with the wastes from packing houses, yeast plants and sanitary sewage.

Computed on the basis of liquid waste per barrel of beer, the flow varied from approximately 180 gal. per barrel in winter to 500 gal. per barrel in summer. The loss of suspended solids averaged 1.68 lb. per barrel, of which 1.28 lb. was organic material. The B.O.D. averaged 3.1 lb. per barrel, equivalent in oxygen demand to the sewage of nineteen persons. Although low in volume, the press effluent of the spent grains is an

important factor in the pollutional equivalent of brewery wastes. Representing only 7.5 per cent of the total volume, it contributes 37 per cent of the total B.O.D. and 31 per cent of the total suspended solids. In order to alleviate the problem of brewery waste disposal, it is suggested to study procedures for: (1) reducing the solids in the waste water from the grain squeezers; (2) recovery of yeast; and (3) economy in the use of water. Both the yeast and the suspended solids probably can be utilized and converted into profitable by-products.

Digest from "Brewery Wastes," by F. W. Mohlman, *Modern Brewer* 21, 35, 1939.

Reason for Keeping Beer in Darkness

CARBON MONOXIDE is formed in beer under the influence of light, but none is formed in darkness. After an eight-day test on beer exposed to light, amounts of carbon monoxide were found up to 15 per cent of the gas in the neck space, and up to 20 per cent when computed to the total gas content.

When more than 2 per cent of carbon monoxide exists in the gas, it means that light injury, causing off-odors, has occurred.

Oxygen content of the gas remains constant at 5 to 6 per cent whether beer is in the light or dark, but air-free packinging of beer results in a product that is more sensitive to light. Nevertheless, it is desirable to keep oxygen out of packaged beer as much as possible, and keep the beer in the dark to prevent off odors. Brown bottles are better than green for this.

Digest from "Something About the Influence of Light on Beer," by F. Mendlik. *Wochenschrift für Brauerei*, 55, 393, 1938. (Published in Germany).

CANNED FOODS

Molded Plastic Cans? —Not Yet

IN THE HOPE of replacing metal containers (especially cans and collapsible tubes) with synthetic plastics, numerous chemical and physical tests have been made with phenol-formaldehyde (phenoplast) and ureaformaldehyde (aminoplast) resin products.

The tests show that neither material, in the present state of development, is capable of meeting the requirements for food containers. Part of the difficulty lies in the chemical composition of phenoplasts and aminoplasts. At sterilization heats they tend to decompose, not rapidly but sufficiently to impair the quality (especially the flavor) of foods in the containers. The aminoplasts tend to give off adsorbed formaldehyde in contact with neutral liquids. In acid liquids their behavior is worse because then they lose some chemically combined as well as adsorbed formaldehyde.

Inequalities in structure and texture are intensified by the heat of sterilization. Bubbles and blisters form, or stratified areas in the container walls tend to separate, or local defects appear where the filler and resin were not sufficiently bonded together. These are the chief types of failure which prevent phenoplasts and aminoplasts from being useful as food containers. Improvements in thermal stability and in structure (homogeneity) would overcome much of the difficulty. Further research is in progress.

Digest from "Plastics and the Canning Industry," by Giuseppe Alesi, *l'Industria italiana delle conserve* 13, 140, 1938. (Published in Italy).

Flash Pasteurized Apple Juice

TO GIVE the apple juice consumer something more than just a can of cider it is necessary: 1, to use the best apples for juice; and, 2, to can or bottle the juice without any loss in flavor or appearance. No process is known as yet which fully meets this ideal. Clarification cannot be effected by any known method without a loss in flavor, yet unclarified juice does not give attractive appearance in bottles, where the sediment is plainly visible.

Flash pasteurization—a modern development—offers great commercial possibilities in a nearer approach to the ideal canned or bottled juice. Deaeration reduces the corrosion which causes so much trouble with canned juice. Juice from tart New York State apples can be flash-pasteurized at 160 deg. F. or higher, but pasteurizing for one minute above 175 deg. F. imparts a slightly cooked flavor.

Deaeration is important whether the juice is canned or bottled, because excessive oxidation is detrimental and the juice is very sensitive to oxygen. The pasteurization temperature may be lowered somewhat if a small amount of preservative, say 0.05 per cent sodium benzoate, is added. The effect is on the yeasts rather than on the bacteria. It is not necessary to kill all the micro-organisms, since remaining cells cannot grow in the hermetically sealed, deaerated juice.

Digest from "Flash Pasteurization of Apple Juice," by C. S. Pederson and D. K. Tressler, *Industrial and Engineering Chemistry* 30, 954, 1938.

FERMENTED FOODS

Causes of Pink Sauerkraut

ABNORMAL SAUERKRAUT, having a pink or red color, is caused by growth of a red yeast. The conditions permitting this yeast to grow are now pretty well understood. The normal kraut fermentation starts with gram-negative bacteria. These are soon crowded out by *Leucnostoc mesenteroides* which produce a moderate acidity. But, in turn, they are overgrown by other organisms producing higher acidity, *Lactobacillus plantatarum* and *Lactobacillus pentoaceticus.*

This three-step fermentation gives good kraut, but anything that interferes with the proper sequence is bad. The No. 2 organism *Leucnostoc* produces CO_2, alcohol and acid and removes air. Its optimum temperature is considerably lower than for No. 3. If anything interfers with No. 2 and lets No. 3 get started out of turn, look for trouble. Such interference may be raising salt content too high, or the acid or the temperature. Low nitrogen content of the cabbage may also disturb the sequence.

No. 2 has the result of inhibiting the red yeast growth, but No. 3 has little effect.

The Federal definition of sauerkraut is also a factor, for it calls for 2 to 3 per cent of salt. Three per cent is too much, for it often results in pink kraut. A better top limit would be 2.5 per-cent salt.

Digest from "Development of Pink Color in Sauerkraut," by C. S. Pederson and C. D. Kelly. *Food Research* 3, 583, 1938.

DAIRY PRODUCTS

Quick Test for Size of Water Droplets in Butter

BUTTER in which the water is present in relatively coarse droplets is more susceptible to spoilage, especially by molds, than butter in which the water is very finely dispersed. Testing for fineness of water droplets has hitherto been too tedious for routine control, and many batches have been passed with coarse droplets because insufficiently worked. A test has now been developed for this purpose which is so simple that routine testing of butter for water dispersion is easy and takes little time.

(*Turn to page 237*)

The Plant Notebook

Trailers Simplify Waste Disposal

How can unreclaimable waste materials be handled economically? If ash, cinder, empty containers, packing room waste and similar refuse are allowed to accumulate in the vicinity of the plant, an extremely unsightly and often unsanitary condition is created.

In a large food processing plant, where the management is thoroughly sold on the advertising value of immaculate housekeeping, both inside and outside of its buildings, trailers placed at strategic points are used as waste receptacles. At prearranged intervals these trailers are picked up by a truck or tractor and the waste removed for final disposal.

For instance, a trailer having a metal-lined body is convenient to the boiler room. Ash and cinder, quenched in the ash pits, are loaded into this trailer by means of wheel barrows. This material is hauled away twice a day and is either spread on paths and roadways traversing the property or piled in a remote place so that it can be sold to contractors or others.

Another trailer is backed up to a door of the receiving and shipping department for combustible refuse. This is hauled to the plant incinerator several times during the day. Empty containers, cans, and similar metal scrap are handled in still another trailer. This waste is sent to a dump whenever the body is filled.

Sludge, screenings, and other semi-solid effluent of the sewerage disposal plant are handled with a tank trailer. This material is transported to an adjacent farm and emptied in drying ponds. After drying it is used as fertilizer. Because of its high lime and nitrogen content it serves well for this purpose.

Light for Maintenance Work

Any really efficient lighting system will include, for maintenance and other workers who must move from place to place, lights that can be moved with them. These may be lights fitted with extension cords and hooks for hanging up at different points. If so, eyescrews can be driven, or eyebolts mounted at strategic points, so that one can find a place from which to hook the light as needed.

Another idea much used of late years, which prevents extension cords from getting in the way yet permits lighting units to be moved around as required, is the type of fixture incorporating a spring-return reel. As the light is moved away from the reel (which is located at the center of the area to be served), cord is unreeled automatically. The cord is taken up automatically on the reel in the same manner when the light is returned.

The illuminating value of light paint should not be overlooked, for repair work must often be done in corners of the plant, away from the windows and well-lighted working areas. White paints and aluminum paints are of high value in this respect, and in many cases it has been proven that they increase the available light 20 per cent or more. This is due, of course, to the fact that they reflect the light, thus making more of it available for actual illumination of the working surfaces.

Avoiding Oil Drip and Slinging

There has been a very great change in the industrial picture during the last few years with reference to lubrication. In the old days it was not at all uncommon to see oil dripping from lineshaft bearings, and in some cases drip pans were suspended beneath bearings to catch the oil as it dripped. Sometimes, one of these pans ran over and made a bad mess, especially if someone happened to jostle it a little with the end of a ladder or in some other way.

Of course, oil dripping around has always been taboo in the food industries to the greatest extent that it could be made so. It is heartening to note that modern equipment, fitted with modern enclosed bearings, has in most cases entirely eliminated the oil problem so far as contamination is concerned. Consequently, if a bearing is found that slings oil, as on a loose pulley, or one that drips oil in any location, it is possible to eliminate the trouble by putting in a bearing that is constructed so that it will not do so.

Even in cases where contamination is not considered, oil being dripped or slung is expensive. It is sure to get onto transmission belts, and gradually it will render them incapable of transmitting power without excessive slipping. The trouble builds up, for slipping generates heat, heat thins the oil in the belt, and as the oil thins the belt becomes even more slippery than before.

Smoke Indication Important

The growing importance of smoke abatement and the increasingly rigid demands of smoke inspectors are, in many locations, making the use of some type of smoke indicating signal highly desirable, in order that one may keep out of trouble. Photo-electric cells, as a means of reporting smoke density which passes a predetermined point, seem to be growing in favor in many places, in some cases being installed inside of the breeching.

So many different things can cause excessive smoke that one can hardly hope to anticipate them all, even when general boiler conditions as such are favorable at the time of installation. Coal pulverizers will gradually wear enough to let the pulverized material come through in a coarser form, and this gradually tends to produce smoke. A boiler may be started up quickly in order to meet a peak demand, and too quick starting will produce a lot of smoke before there is enough heat to provide for complete combustion. Failure to get the proper adjustment of coal feed with relation to air supply will produce smoke in an excessive amount. Oil burner tips in oil-burning installations may become covered with a deposit that makes it impossible for them to function properly, and again the answer is the production of plenty of smoke.

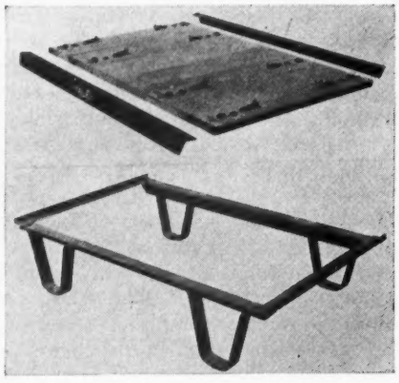
With a good smoke indicating signal reporting the condition promptly as it begins to develop, one is able to look into the matter at once and apply what remedies may be indicated before the degree of smoke increase becomes really serious.

Food Equipment News

REVIEW OF FOOD PROCESSING EQUIPMENT, ACCESSORIES, AND SUPPLIES

Skid Platform

YALE & TOWNE MFG. Co., 4530 Tacony St., Philadelphia, Pa., have developed a simple type of skid platform for material handling purposes, which is provided with a renewable top. This consists of a welded frame of steel bar and angle iron, which is properly punched so that a wooden platform can be bolted on. As shown in the photograph, the frame is shipped ready for installing the top. It is then only a matter of laying on the boards, placing the upper side angles, and putting in the bolts and tightening the nuts. The platform is then ready for use. These platforms are provided in a clearance range from 6½ to 12 in.



Skid platform with renewable top.

Vibrating Screen

AJAX FLEXIBLE COUPLING Co., Westfield, N. Y., is distributing a new batch vibrating screen of the single deck type. This screen has a cloth area 12x24 in. and its overall dimensions are 36 in. long, 18 in. wide and 15 in. high. It is arranged for quick change of cloth and frame, which it is said can be accomplished in 30 seconds.

This screen, which is for the sifting of dry materials, has been particularly devised for use in short runs or in test work. It is equipped with a $\frac{1}{12}$ hp. motor operating on 60 cycle, 110 volt alternating current. The vibrating unit is the Ajax-Shaler shaker, size 3B, and is driven from the motor by a V-belt. The total weight of this unit is 95 lb.

Steel Strapping Tool

A new automatic seal-feed tool for applying $\frac{5}{8}$ in. and $\frac{3}{4}$ in. steel straps, for banding heavy shipments, including skid platform loads, has been developed by Acme Steel Co., Chicago, Ill. With this tool, one lever tensions the band, while the other seals the joint and cuts the strap from the coil. Seals for the tool are furnished in clips of 50, so that 50 joints can be sealed before reloading the tool. This tool is arranged to be used in either the side or top of a package or in case it is desired, can be mounted on a conveyor on which the packages are handled.

Sight flow indicator for liquid lines.

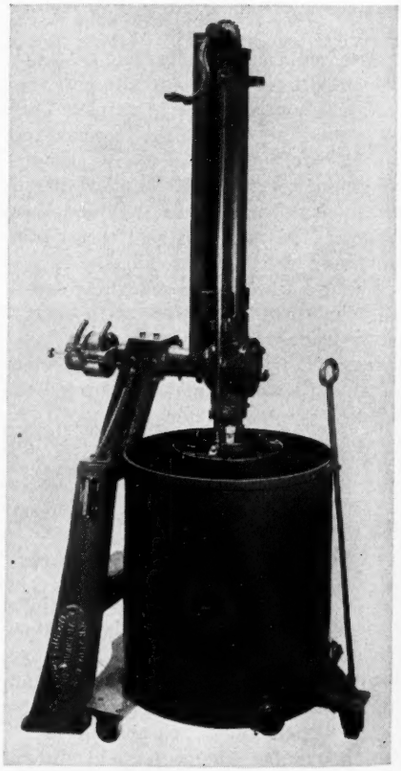
Sight Flow Indicator

FISCHER & PORTER Co., 110 W. Penn St., Germantown, Philadelphia, Pa., are distributing the "F & P Bull's Eye" sight flow indicator for determining whether or not fluid is flowing through a pipe line. This is not a device for metering the rate of flow—it is simply an indicator as to whether or not flow is occurring. The indicator consists of a pipe fitting having two round sight glasses located on opposite sides and held in position by bolted cover plates. The joints are packed against leakage by gaskets of Neoprene or Thiokol, depending upon the service which is desired. Between the glasses is a flapper suspended in such a manner that it hangs against a seat when there is no flow. As soon as flow commences, the flapper swings outward into a position where it is easily seen through the sight glasses.

This indicator comes in sizes from ½ to 3 in. and is available in cast iron, bronze, aluminum, 18-8 stainless steel or other materials. Connections can be either screwed or flanged as desired. The flapper is always supplied in the same material as is the body unless otherwise specified. When the indicator is to be installed in a vertical line with downward flow, it is installed in a horizontal position by means of elbows.

"Change-Tank" Mixer

FOR THE MIXING, dissolving or emulsifying of food ingredients, Abbe Engineering Co., 50 Church St., New York, N. Y., has developed the Abbe-Lenart "Change-Tank" mixer. The feature of this device is that it can be inserted into any container. This per-



"Change-tank" mixing device

mits quick change from batch to batch.

In operation, the container is placed under the mixing head, which is then lowered by means of a hand wheel to the mixing position. A counterweight makes raising and lowering easy. Drive is by pulley or geared motor. Design is for easy cleaning. There are four sizes, from 5 to 250 gallons.

Centrifugal Pump

LAWRENCE PUMP & ENGINE Co., Lawrence, Mass., has brought out the Type "HBD" single stage, side suction centrifugal pump. This is a heavy duty design for general industrial pumping. Sizes range from 1½ in. to 18 in. disharge; capacities from 10 gal. per min. to 15,000 gal. per min.; head up to 300 ft. in the smaller sizes.

Casings are of solid volute type. Impellers are of one-piece, enclosed type. Casings are cast iron, with impellers of cast iron, bronze or specially alloys. External ball bearings support the shaft. Packing glands are of bronze, split, two-piece interlocking construction, easily removed for packing stuffing boxes.

Fork Truck Skid Platform

A SKID PLATFORM for the transportation and storage of material in bags, so arranged that the load can be picked up from the platform by means of a fork truck, has been developed by Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa. This platform, as can be seen in the illustration, consists of a normal type skid platform upon which are fastened a number of steel channel runners, bolted to the deck, and 7½ in. wide each. These runners are spaced 8 in. apart and can be removed from the platform when it is desired to use the platform in regular service.

In operation, this platform is used where bags are placed on it from the hold of a ship, or in other ways by means of a crane. The platform is then taken in the normal way to the storage space by a hand-lift truck, or electric lift truck. When it is desired to remove the bags, the fork of a fork truck easily passes between the steel runners and lifts the load of bags away from the platform.

Automatic Doughnut Machine

PEERLESS BRANDS, INC., Philadelphia, Pa., have introduced a small doughnut machine, claimed to be the first to bring the economies and quality of automatic, continuous operation to the smaller baker. This machine is also said to be the first automatic, continuous device to cook a doughnut on both sides at once by submerging it in hot fat throughout the whole cooking time. As a result, the machine is said to reduce cooking time by 58 per cent.

In operation, the fat is kept heated to the correct temperature (365 to 375 deg. F.) by a thermostatically controlled gas burner. An overflow drain keeps the fat level constant. A tray just under the top hood takes solid fat and melts it to compensate for fat losses in the cooking tank.

Batter is fed from a 2.5 qt. pressure tank. The doughnuts are mechanically formed by a device in the batter tank, which is fed by air pressure on top of the batter in the tank. This air pressure is adjustable, so that the amount of batter in each doughnut can be controlled. The forming device feeds the doughnuts to an endless belt in the cooking tank which keeps them submerged until discharged onto another belt which carries them out, allowing them to drain.

Capacity is 35 doz. per hour. The machine requires a 1/3 hp. motor to drive the air pump, cutter, and all other moving parts.

Direct-Set Indicating Controller

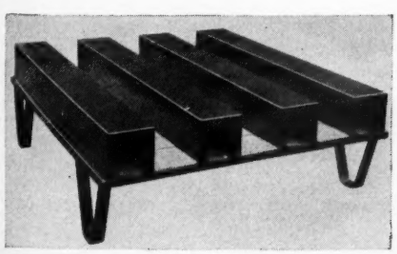
C. J. TAGLIABUE MFG. Co., Park and Nostrand Aves., Brooklyn, N. Y., has direct-set indicating controllers for temperature (Model 9-TIC) and for pressure (Model 9-PIC). These instruments are available in either "on-off" or "throttling" types. With the direct-set feature, both the white control pointer and the red setting pointer indicate on the same graduated scale, providing clear, direct reading for checking control performance.

Conveyor Package Counter

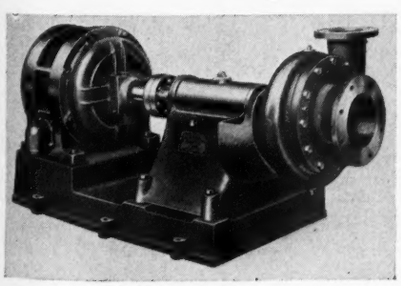
STANDARD CONVEYOR Co., North St. Paul, Minn., has brought out a device for the exact recording of a given number of containers passing over a conveyor line. The device counts and records the predetermined number and then stops the conveyor.

The case containing the entire recording mechanism can be located at any remote point, as in a shipping clerk's office. A bell or signal light is placed at any desired location. This signal indicates to the operator of the conveyor when the run is completed.

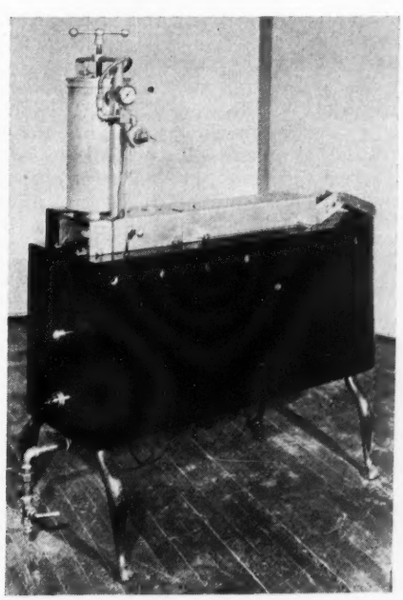
After the counter has stopped the conveyor, it cannot be started again except at the counter box itself.



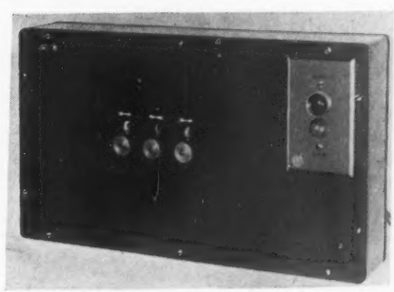
Skid platform designed for use in combination with fork truck handling



Centrifugal pump



Small automatic continuous doughnut machine



Counter with automatic stop for conveyors

Just off the Press

BOOKLETS • LITERATURE • BULLETINS

Food Plant Equipment

AGITATORS—A 6-page illustrated folder on the performance of Pneumix air-motored agitators in laboratories and industrial plants has been issued by Eclipse Air Brush Co., Inc., 390 Park Ave., Newark, N. J.

ALUMINUM EQUIPMENT — Steam jacketed kettles and other aluminum food processing equipment for industrial plants and institutions are illustrated and described with specifications in a 64-page loose-leaf catalog, No. 66, issued by Aluminum Cooking Utensil Co., New Kensington, Pa.

BAKERY MIXER—"The Glen Power Plus Mixer" claimed to produce 2½ to 6 times greater pulling power than the ordinary vertical mixer for batter and dough batches and to operate at 400 different speeds, is the subject of a folder issued by American Machine & Foundry Co., 511 Fifth Ave., New York, N. Y.

CONVEYING EQUIPMENT — "The Fact Book of Flexible Metal Hose and Tubing" is the title of a 20-page illustrated booklet issued by Flexible Metal Hose and Tubing Institute, 150 Broadway, New York, N. Y., describing flexible connections for various industrial installations.

CONVEYORS—"Natural Laws Applied to Production," is the title of a 32-page illustrated bound book issued by Mathews Conveyor Co., Ellwood City, Pa., discusses the continuous flow principle of handling materials as applied to conveyors as production equipment for processing, assembling, packaging, storage and loading operations.

CORN MILLING MACHINERY—The Beall Improvements Co., Inc., Decatur, Ill., has recently issued Catalog 22, containing 64 pages illustrating and describing its complete line of corn milling machinery, with specifications, capacities and list prices.

FILTERS—"80 Ways to Make More Money," title of a Cuno Engineering Corp., Meriden, Conn., bulletin, presents 80 actual cases of Cuno filter's industrial uses covering process, power and heavy industry.

GRAIN PROCESSING EQUIPMENT—Folders describing the "Gyro-Whip" sifter for bolting installations, the "Grade-Maker" cylinder separator for grain cleaning, the centrifugal aspirator for purifying hominy and grits, and electro-magnetic separators and electro-spout magnets for protection against tramp iron and magnetic particles, have been issued by The Richmond Mfg. Co., Lockport, N. Y.

MILK PLANT COOLER—A sweet water cooler for use in dairy products refrigeration is described and illustrated in Bulletin No. G-32. by Cherry-Burrell Corp., 427 W. Randolph St., Chicago, Ill.

SAUSAGE EQUIPMENT—John E. Smith's Sons Co., 50 Broadway, Buffalo, N. Y., has published Catalog A covering "Buffalo" sausage making machinery and repair parts in 71 illustrated pages and a folder describing three new silent cutters.

Plant Accessories and Supplies

AIR CONDITIONING AND HEATING—Carrier Corp., Syracuse, N. Y., has published an illustrated 12-page bulletin dealing with air conditioning, refrigeration and space heating for industrial application, and a 16-page bulletin on various types of unit heaters.

AIR EJECTORS—Bulletin F. 8446, issued by Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., discusses steam jet air ejectors for industrial processes requiring vacuum operation.

BEARINGS—"Oilite" bronze bearings for use in trucks, conveyors, air conditioners, electric motors and other equipment are described in Form No. 1-38 by Boston Gear Works, Inc., North Quincy, Mass.

BOILER PLANT EQUIPMENT—"C-E" direct fired systems for burning pulverized coal in mills is the subject of a 34-page illustrated catalog issued by Combustion Engineering Co., Inc., 200 Madison Ave., New York, N. Y.

CONTINUOUS BLOWDOWN—The Elgin continuous blowdown system for control and regulation of amount of blowdown and reclamation of heat in steam boiler plants is described in Bulletin 510 by Elgin Softener Corp., Elgin, Ill.

DIESEL ENGINES—-Ingersoll-Rand Co., Phillipsburg, N. J., has published a 40-page catalog, Form 10110, dealing with Type "S" diesel engine.

ICE-MAKING EQUIPMENT—Bulletin No. 127-F, one of the Ice and Frost series of bulletins, describing each of the parts of an ice-making plant, has been published by Frick Co., Waynesboro, Pa.

Control Equipment

CONTROL EQUIPMENT—"Tag" indicating, recording and controlling instruments for temperature and pressure are described with specifications and charts in a 64-page Catalog 1060D by C. J. Tagliabue Mfg. Co., Park and Nostrand Aves. Brooklyn, N. Y.

CONTROL INSTRUMENTS—The Bristol Co., Waterbury, Conn., has brought out two new bulletins as follows: Catalog No. 1250, a new general catalog of small types of indicating, recording and controlling thermometers; Bulletin 507, describing the "Pyromaster" recording potentiometer for use in various types of control instruments.

Food Ingredients

FLAVORINGS—Dodge & Olcott Co., 180 Varick St., New York, N. Y., has published its January, 1939, wholesale price list for essential oils, flavors, oleo resins, vanilla and food colors.

PRESERVING AGENT — "Preserving with Seydel" is the title of a 21-page treatise on benzoate of soda in its relation to the food industry and the history, federal and state laws and preserving action of benzoate as compiled by the Seydel Chemical Co., Jersey City, N. J.

The Food Industry News

GENERAL NEWS, BUSINESS TRENDS, MEN, JOBS AND COMPANIES • APRIL, 1939

Bakery Engineers Meet in Chicago; Research Committee Reports Findings

Reports on its Research Committee studies were a new feature on the program of the Sixteenth Annual Meeting of American Society of Bakery Engineers, Chicago, March 13 to 16.

Carried out under the sponsorship of the Cooperative Research Committee, these findings represent a combined effort of the Engineers and the American Association of Cereal Chemists to determine the effect of milk solids and mineral content of water upon bake shop practice. While the effect of water compositions upon boiler operation and pipe corrosion was reported upon, emphasis was placed on the effect of water constituents upon fermentation in sponge and straight doughs, with rich and lean formulas, and with different yeasts, yeast foods and flours. Calcium oxide, calcium carbonate, calcium sulphate, magnesium chloride, magnesium oxide and sodium bicarbonate were cited as the minerals in water having the greatest effect upon fermentation. Because of the buffering action of milk solids their effects upon milk bread doughs are not as pronounced as upon the non-milk bread doughs. For that reason the experimental tests were largely carried out on doughs with no milk content. Synthetic waters containing distilled water and varying amounts of the previous named minerals were made up to approximate the content of the minerals in quantities commonly found in industrial waters, in four-fold and ten-fold quantities commonly found. In general summation of the results the calcium salts gave less harmful effects than did the magnesium salts as long as alkalinity was avoided.

The mineral contents of the waters studied had their greatest injurious effect upon yeast when the yeast was suspended in the water before adition to the mix. Addition of the yeast to the mix with the flour gave best results.

In continuing its work on factors affecting bread consumption, the Bread Consumption Committee reported that toast constituted 50 per cent of the total bread consumption of 27.4 per cent of individuals questioned. Also, that 58.6 per cent wanted white bread toast; 53.2 per cent wanted the toast crisp; 77.3 per cent favored medium brown toast, with equal choice between thick or thin slices; and 70.1 per cent wanted theirs from the standard round top loaf bread instead of from the sandwich or twisted types of loaves. Of the individuals questioned, 21.8 per cent eat four slices, 15.1 per cent eat five slices and 20.2 per cent eat six slices per day.

CHIEF BAKERY ENGINEER

Wm. H. Hauck, Hauck Bakeries, St. Louis, was named president of American Society of Bakery Engineers at the annual convention. Walter T. Molloy, Cherry City Baking Co., Salem, Ore., was named first vice-president; O. S. Otting, Red Star Yeast Co., Minneapolis, second vice-president. Victor E. Marx continues as secretary-treasurer.

An effect of the adoption of a standard baking pan upon bread consumption is evidenced in Oregon. Before the pan sizes were standardized by legislation, bakers made only 68.7 per cent of the bread consumed. Since the legislation has become effective, the consumption of baker's bread has risen to 83 per cent.

The twisted loaf type of bread, although adopted to give a loaf of improved appearance, better keeping quality and fewer or no large holes, has proved unpopular and is cited as contributing to a decline in consumption of baker's bread. Toughness of crust and crumb is one of the most objectionable characteristics. It has necessitated a study of formulas, mixing practice, fermentation procedure, machining and twisting technic and oven treatment. Looseness of twist, as results when only one twister is used, and use of a conveyor to permit a short resting period before twisting and again before panning appear to give best results in obtaining tenderness in a loaf of twisted bread.

The recommended pan size for a 1-lb. baked loaf of twisted bread is:

Top inside length	9	in.
Top inside width	4¾	in.
Bottom outside length	8½	in.
Bottom outside width	4	in.
Depth	3	in.
Approximate cubical content	114.8	cu. in.
Total end flare	½	in.
Total side flare	¾	in.

This pan has a 6.04 cu.in. displacement per ounce of dough whereas the pan for the round top type of loaf has a 5.85 cu.in. displacement per ounce of dough (1-lb. baked loaf has a scaling weight of 19 oz. of dough).

Safety, personnel relations, cake flavors and cake merchandising were among other subjects covered in the meeting which set a new all time registration record of 1,098; 9.8 per cent over last year's all-time high record.

Pointers on Packaging Heard at Conference

Information on packaging trends and exhibition by more than 80 companies of latest methods of packaging made a success of the Ninth Conference on Packaging, Packing and Shipping held in New York, March 7 to 10.

Speaking on informative labeling from the manufacturers viewpoint, F. S. Blanchard, Pacific Mills, made the point that the consumer movement has settled informative labeling. The real problem of informative labeling, he said, is not whether it is a good thing, but how to guide it along practical lines. Mr. Blanchard advised dividing the information asked for in connection with consumer products into two main classes: (1) Of what is the product made? (2) What will the product do?

The consumers point of view was presented by Dr. Esther Cole Franklin, American Association of University Women. Consumers want the protection and the convenience which the package offers, she said, but they want considerably more. For they are still buying the product which is contained in the package. And they want information on the usefulness and quality of the product itself. The modern consumer,

she indicated, is wary of the unusually styled package and wonders whether it is camouflage.

Important strides in the manufacture of glass containers were reported by Dr. J. H. Toulouse, Owens-Illinois Glass Co. The weight of this type of container is being reduced and glass design is being better adapted to the machinery that forms the container and the equipment that handles it.

Pertinent information on packaging frozen foods was given by Harry Carlton, University of Tennessee. Protection from the dehydrating effects of the atmosphere in the storage room, he said, presented a major problem. He also pointed out that in freezing packaged foods a thin package is desirable, as it speeds freezing. He suggested that while the industry is young and before its standards have been established and too much equipment built, the packaging industry has the opportunity to develop an entirely new and novel packaging procedure, if it can. In fact, he said, unless package shapes, sizes and materials are standardized to a point where costs can be lowered by mass production, the industry may have to look for some other type of package.

Announces New Method For Making Beef Tender

Development of a commercially practicable method of tenderizing beef by aging nineteen times faster than the natural "hanging" or "ripening" process was announced on March 21 by Mellon Institute of Industrial Research, Pittsburgh. The method involves the use of the "Sterilamp," or special ultraviolet lamp developed by Westinghouse. The ultra-violet keeps the beef free of mold and bacteria and permits the temperature of the "cooler" to be raised to 60 deg. F. or higher to speed the action of the enzymes in the meat. This action softens or tenderizes the tissue.

The recent work leading to the announcement of the method was done under the Kroger Food Foundation. Detailed information on the Sterilamp and its applications in the meat and other food industries has been recorded in the following articles published in FOOD INDUSTRIES: "Mold and Bacteria Killed by New Lamp," June, 1936; "Another Example of Supermarket Progress," October, 1937; "A New Process Goes to Work," May, 1938; and "How to Apply Rentschlerizing," June, 1938.

Form Packaging Institute

Two important associations in the packaging industry have united to form Packaging Institute. Organized at the close of the Packaging Exposition, the Institute was created by Packaging Machinery Manufacturer's Institute and Production Manager's Association. Each of these associations will continue to function individually, but joint meetings will be held "to foster, improve and abet the status of the packaging industry as a whole." One of the objectives will be to formulate constructive publicity for consumer education on the benefits derived from good packaging.

Plan to Move Surpluses Will Be Tried This Month

Increased business amounting to some 50 per cent of the food purchases of the 22,000,000 people on relief is expected to result from the "stamp" plan proposed by the government and approved by representatives of the food industries. It is estimated that the reliefers now spend $1,144,000,000 annually for food, which would make the new business amount to about $570,000,000 a year.

The plan, as announced following a conference of the National Food and Grocery Conference Committee and representatives of the government, involves the distribution of surplus agricultural commodities through normal trade channels in a limited number of cities on an experimental basis. It is expected to go into effect the middle of this month.

Through the method adopted for distributing the stamps with which to buy food, additional purchasing power will be provided for surplus products. There are three variations of the plan. Each is expected to be given a trial in three or more cities. All variations of the system, however, are based upon the same fundamental principle—issuance by the Federal Surplus Commodities Corp. of stamps that are good for the purchase of surplus food products. Under two of the plan's variations, two forms of stamps are to be issued, blue

CAPITAL VIEWS

NEW MILK INQUIRY—The proposal to investigate the Washington, D. C., milk supply touched off a supply of explosives under the whole dairy industry. As a result the investigation authorized by the House of Representatives through its District of Columbia committee is likely to deal with milk "monopoly" and those many related questions which have nothing to do with the original purpose of the Congressmen who started this affair. One sure result of general significance for the dairy products industry of the country is that Congressmen will be more than ever convinced that more regulation is needed, *a la* public utility methods. The only thing that can stop this train of events will be curtailing the funds for the proposed investigators, a result not too likely because some of the corn-belt Congressmen think this is a good chance to open the Eastern metropolitan markets to Midwestern milk.

INADEQUATE DIETS—Recent publications of the Department of Agriculture demonstrate the extent of "nutritive adequacy of diets." But the fact is that much of the material looks like propaganda to provide support for the Wallace two-price food plan which proceeds from the assumption that more food easily available to folks on relief would increase food consumption. Conspicuously *not* emphasized is that many low spenders for food obtain much better diets for their families than big spenders. This is convincingly proven by Secretary Wallace's own Bureau of Home Economics.

LIVESTOCK REGULATION—"It is a short step from milk to beef in the program of regimentation." Proceeding on this theory some Old Deal leaders are warning cattle men and others that the Government entry into special loans on livestock may be merely a step toward closer participation of the Government in their business. But Congress is not expected to be worried when further proposals are made for additional money to care for ranchers, or farmers, who want easy credit. The danger of the proceeding is admitted, but these folks still vote.

"HIGH-HANDED" LABOR—The three recent sweeping condemnations of National Labor Relations Board by the Supreme Court dealt with three fundamentals of any manufacturing plant management. In effect these decisions mean: (1) Sit-down strikes are wholly unlawful. (2) Striking in violation of a labor contract removes NLRB protection from the employees involved. (3) Mere inference by NLRB is not enough to prove that a company fails to bargain collectively and therefore provide a basis for reinstatement of striking employees. Washington believes that these decisions restore to industrial management many rights previously thought abrogated by the Labor Relations Act. But the law is constitutional, and its broad principles still must be observed by management under decisions previously rendered.

STANDARD CANS—Only technical difficulties remained late in March to prevent announcement of important lists of standard can sizes for each of the major types of fruits and vegetables so marketed. A logical corollary to announcement by National Canners Association will be charging of those who do not conform to standard can sizes with "unfair trade practices." However, no one is expecting federal prosecution, but just pressure for uniformity as a matter of good business.

New Interpretation on Correct Labeling

DESPITE widespread belief that all the mandatory information required on a label by the new Federal Food, Drug, and Cosmetic Law should be on the front panel, this view is not wholly correct. Food and Drug Administration officials have called attention to the fact that neither the law nor the regulations require it.

National Canners Association has proposed a special arrangement of material on a label involving a special information panel occupying 20 per cent of the label on which is to be placed the required information. The Food and Drug Administration does not take exception to this arrangement, which is as far as they can go in expressing approval. Under this plan the "Government Panel" or "Information Panel" for cylindrical packages is immediately to the right of the main panel, and together with the main panel occupies 60 per cent of the label space.

On small labels the information panel may need to be larger than 20 per cent in order to carry all the required information with such conspicuousness as to render it likely to be read.

The foregoing new principle of interpreting the requirements of the new law has not yet been worked out for labels of packages other than cylindrical packages. The important feature is that the main panel need not carry all the confusion of mandatory statements if the information is properly and adequately presented elsewhere with the prescribed degree of conspicuousness.

ones good for the purchase of only surplus foods and orange stamps which will buy any foods. The third method provides for issuance of blue stamps only.

The value of the orange stamps issued to any applicant would depend upon the number of people in his family. Studies have indicated that the average person on relief spends $1 or less per person per week for food. The minimum value of the orange stamps that would be issued will be on the basis of $1 a week per person. Then the person on relief would receive blue stamps amounting in value to 50 cents per person per week, thereby increasing his food purchasing power by 50 per cent.

The list of surplus foods to be included in the plan has not been announced, but fresh fruits, a variety of vegetables, butter and eggs have been mentioned by Secretary Wallace. Fish apparently will not be included, although requested by the Bureau of Fisheries.

Except in the areas selected as proving grounds for the new plan, FSCC surplus removal and distribution activities will continue as in the past.

Industries Using Malt Will Meet on April 14

Need for research on barley malt quality has resulted in plans for a meeting of representatives of the interested industries to take the problem under advisement. This meeting will be held at the Bismarck Hotel, Chicago, April 14, and these associations have been asked to send representatives: United Malsters Association, Master Brewers Association of America, United States Brewers Association, Brewing Industry, Inc., American Brewers Association and American Society of Brewing Chemists. Others interested in planning a malt research organization and program are also asked to attend.

Heading up the temporary committee appointed to suggest plans for the organization of this research, and which called the meeting for this month, is James G. Dickson, Agronomy Bldg., Madison, Wis.

Program for Conference On Freezing Announced

Important factors affecting the preservation of foods by refrigeration will be discussed by experts at the Third Food Preservation Conference. To be held April 13-14 at the University of Texas, Austin, the conference will be under the auspices of the University with the cooperation of American Society of Refrigerating Engineers, A. & M. Engineering College of Texas and Southwestern Ice Manufacturers Association.

The first session of the conference will include: "Bacteria and Enzymes," Prof. J. Q. Sealey, Texas Technological College; "Refrigeration and the Packing Industry," Henry G. Tefft, Institute of American Meat Packers; "Practical Aspects of Food Technology," Roy W. Snyder, Texas A. & M.

The second session, which will follow a welcoming luncheon, will cover: "A Survey of Locker Plant Practice," George Treat; "The Operation of the Locker Plant," Ernest F. Little, consulting engineer; "Economics of Plant Operation," P. T. Montfort, Texas A. & M., and a showing of York movies on locker plants. The third session will be devoted to ice freezing and melting, while the fourth, on the second day of the conference, will include: "Freezing Media for the Immersion Method of Freezing," Dr. J. G. Woodroof, Georgia Experiment Station; "Preparation of Frozen and Refrigerated Foods," Jennie Wilmot, University of Texas; "Quality Control in Food Freezing," A General Foods representative; and showing of a movie on frozen foods. At the fifth session these papers will be presented: "Modern Refrigerator Car Design," J. L. Townshend, Canadian National Railways; "Use of Ice for Low Temperature Trucks," Drumgold and Glenn representative; "Review of Transportation Methods," W. R. Woolrich, University of Texas; and "Portable Precooling Systems," Ralph Killingstad, Shippers Precooling Service.

New Indiana Food Act Conforms with Federal

First of the states to fall in line, Indiana on March 6 passed the Uniform Indiana Food, Drug and Cosmetic Act. The Act and regulations to be promulgated "insofar as applicable, shall be so interpreted and construed as to effectuate its general purpose to enact state legislation uniform with the Federal act." (Sec. 32.)

The act takes effect March 6, 1940, except for immediate enforcement of certain sections pertaining to food standards, new drugs and cosmetics.

Effective immediately is Sec. 11 which provides for immediate adoption by the Indiana State Board of Health, and without a hearing, of any definitions or standard of identity, quality or fill of container for any food which is promulgated under Sec. 401 of the Federal act or the Federal Meat Inspection Act of 1907. The Board may also promulgate standards for other foods.

The Board is given authority by Sec. 26, effective immediately, to conduct such hearings and to promulgate regulations which shall become effective on or after the effective date of the act as the Secretary shall direct.

Also effective at once is Sec. 14, which provides for the registration of every manufacturer, processor, repackager or wholesale distributor of food, drugs or cosmetics. Registration is to be filed with the Indiana State Board of Health within 30 days after passage of the act.

Sec. 12, effective March 6, 1940, deals with adulterated foods and is practically synonymous with Sec. 402 of the Federal act except for the addition of certain descriptive words.

Sec. 12 (b) (4) of the Indiana law adds the proviso, not given in the similar Federal passage, "that clauses (1) and (2) of this subdivision (b) shall not prohibit the removal of butterfat from or the addition of skim milk to dairy products which comply with definitions and standards for such products as adopted by the Board."

Sec. 12 (c) follows Federal Sec. 402 (c) in regard to the use of only certified coal-tar colors except for the omission of the proviso excepting the coloring of citrus fruits.

The Indiana Sec. 12 also adds a paragraph (e) stating that a food shall be deemed to be adulterated, "If it falls below the standard of purity, quality, or strength which it purports or is represented to possess."

Sec. 14 on misbranded foods of the new Indiana law corresponds exactly with Federal Sec. 403.

The new Indiana act also conforms further with Federal acts by including Sec. 24 which reads, "An advertisement of a food, drug, device, or cosmetic shall be deemed to be false, if it is false or misleading in any particular."

All laws or parts of laws in conflict with the new act are repealed upon the effective date of the law in 1940 except that laws or parts of laws providing for a license are not repealed insofar as they are consistent with the new act.

Food Bills Continue; Some States Adjourn

Final wind-up by some state legislatures, some through statutory limits on sessions, has had little effect on the number of food bills proposed by state law makers. Among states adjourned are Alabama, Arizona, Idaho, Montana, Oregon, South Carolina, South Dakota, Washington, Wyoming, West Virginia and Indiana.

Arkansas' food law, bereft of an official enforcement agency since 1933, has been vested in the State Board of Health by approval of Senate Bill 455, effective June 8, 1939. Though not as broad in scope, such as not requiring ingredient listing, the amended law proposes to conform, as far as is practicable, with federal regulations.

Alabama House Bill 118, providing for a new milk control board, was approved as was Senate Bill 142 exempting home delivered milk from the 2 per cent state sales tax.

In Idaho, House Bill 219 prohibiting the sale of adulterated sausage was made law. Also passed were House bills 193 raising the milk fat requirement in fruit and nut ice cream to 12 per cent, and 192 amending Sec. 36-705 Annotated Code, pertaining to monthly creamery reports.

The Montana governor signed Senate Bill 104 relating to inspection of fruits and vegetables and HB 164 creating a state board of food distributors to regulate food distribution in relation to the pure food act.

The Oregon legislature in SB 1 repealed the state's bakery board law, and in its stead passed HB 511 which vests bakery sanitation control in the state department of agriculture. Final legislative approval was also given HB 201, establishing quality standards for eggs.

Final approval was given in the state of Washington to HB 189, which creates a Dairy Products Commission. Also approved was SB 408 to license macaroni manufacturers.

The Indiana milk control act was extended until June 30, 1941, and a state egg board, HB 282, was created. By the governor's signature on the new Markland Liquor Control bill, effective immediately because of an emergency clause, the beer port-of-entry system was abolished.

Governor Rivers of Georgia has signed a bill retaining the state milk control law and increasing the administrative board from five to seven.

North Dakota legislators gave final approval to HB 102 which forbids sale in the state of fermented malt beverages containing less than 66⅔ per cent barley malt. Also approved was HB 263 regarding beverage licenses and HB 120 which makes law the regulations of the dairy commission in regard to cream handlers.

In Utah final legislative approval was given SB 147 to strengthen the present law with respect to use of containers by any one other than the owner.

Recently introduced into several state legislatures are bills revising the entire state food law in line with the new Federal act. In New York it is S 1424, in Oklahoma, S 219, in Delaware, SB 79, and in Missouri, HB 604.

A substitute food, drug and cosmetic act, HB 149, modeled after new federal statutes, has been approved by the Nevada House and has gone to the Senate for action.

Proposed uniform food and drug acts have been killed in Arizona, Montana and Utah.

CONVENTIONS

APRIL

6– 8—Specialty Bakery Owners of America, Hotel Riverside Plaza, New York, N. Y.

13–14—Food Preservation Conference, University of Texas, Austin.

16–21—Southern Bakers Association, convention cruise from Jacksonville, Fla., to Havana.

20—American Dry Milk Institute, Edgewater Beach Hotel, Chicago.

25–27—Pacific Northwest Bakers Conference, Multnomah Hotel, Portland, Ore.

27–29—American Society of Biological Chemists, Hotel Royal York, Toronto.

MAY

1– 2—Bakery Sales Association, Drake Hotel, Chicago.

8—Western Confectioners Association, Sir Francis Drake Hotel, San Francisco.

8– 9—Associated Grocery Manufacturers of America, mid-year meeting, White Sulphur Springs, W. Va.

8–10—American Spice Trade Association, Hotel Astor, New York.

8–10—National Cottonseed Products Association, Jung Hotel, New Orleans, La.

16–18—Biscuit and Crackers Manufacturers Association of America, Palmer House, Chicago.

18–20—Rice Millers Association, Arlington Hotel, Hot Springs, Ark.

22–25—Confectionery Industries Exposition and Convention of National Confectioners Association, Palmer House, Chicago.

22–26—American Association of Cereal Chemists, President Hotel, Kansas City, Mo.

22–26—American Society of Brewing Chemists, Kansas City, Mo.

Food Standard Hearings Will Be Held This Month

To give the industry and consumers opportunity to present facts on which can be based definitions and standards of identity, quality and fill of container for canned peaches, apricots, pears and cherries, public hearings will be held beginning April 10. The forms of statement required on the label in certain instances also will be discussed.

Similar public hearings on a definition and standards of identity, quality and fill of container for canned peas are scheduled for April 17.

Evidence upon which to establish standards of identity for 39 different canned vegetables or mixtures of these vegetables will be received by the Department of Agriculture at a public hearing in Washington, D. C., on April 24. A hearing in regard to standards for cream, whipping cream, evaporated, dried and sweetened condensed milk will be held on May 1. A hearing on standards of operation for private motor carriers will be held in Washington by the Interstate Commerce Commission on April 11.

Orders Change for Cheese

Little cheeses of the brick, limburger and Roquefort types no longer are to be exempt from declaring the net weight on the package. The new deal for cheese takes effect June 25, under the Food, Drug and Cosmetic Act of 1938.

Standards for Frozen Peas

Proposed tentative U. S. Standards for grades of frozen peas were announced March 10 by the Bureau of Agricultural Economics. Based on tests for color, absence of defects, tenderness and maturity of the peas, the proposed tentative grades would provide standards for U. S. Grade A (Fancy), U. S. Grade C (Standard) and Off-Grade Quality (Substandard).

Proposes Trade Rules For Wine Industry

Trade practice rules for the wine industry have been proposed by the Federal Trade Commission, and a public hearing on them will be held April 11 in Washington, D. C. Following closely the pattern of fair trade practice codes

established in other industries, the proposed wine regulations are divided into two groups. Group I pertains to breach of contract, enticing away of the employees of competitors, defamation of competitors, espionage, threats of suit not made in good faith, imitation of trademarks, unlawful price discrimination, substitution of products which do not meet contract specifications, false invoicing, misrepresentation as to character of business, combination to fix prices and abetting the use of unfair trade practices. Group II of the suggested regulations covers repudiation of contracts, abuse of buying and selling power and maintenance of accurate records.

Corn Canners Move To Adjust Production

In an attempt to adjust production to levels which will avoid disastrous surpluses, the corn canning industry has organized Corn Canners Service Bureau. With headquarters in Chicago, the new service bureau has as its secretary-treasurer, Wilbur G. Carlson, for the past six years with the Wisconsin Agricultural Department.

The bureau will figure the size of corn pack for the year ahead which will permit absorption of the carryover in an orderly manner so that it will not be necessary to force stocks on the market and take losses on them. The bureau will collect the statistics on which to base its figures from state committees and will distribute its findings through those committees.

Represented in the new association are concerns engaged in canning corn, can companies, can machinery and supply companies and financial interests connected with the corn canning industry.

More News about Fish

Extension of the news reporting service of the Bureau of Fisheries to include a new office in Jacksonville, Fla., has been announced by Harry L. Hopkins, Secretary of Commerce. The service will include a daily report on fish production, including shrimp, in Florida, shipments of these products out of the state and prices. Weekly cold storage movements and holdings in storage warehouses in southern states, the weekly shrimp pack and a summary of market supplies and prices in New York and Boston will be given.

Data for the Curves

In preparing the curves shown on this and the succeeding page of FOOD INDUSTRIES, data were obtained from the following sources: Prices received by farmers, U. S. Department of Agriculture; employment, payrolls, wholesale and retail prices, U. S. Department of Labor; cost of living, National Industrial Conference Board; commodity price index, *N. Y. Journal of Commerce;* business activity index, *Business Week;* pig crop, Bureau of Agricultural Economics, U. S. Department of Agriculture.

Construction News

	Pending (thousands)	Awarded March (thousands)	Total Awarded 1939 (thousands)
Bakery	$40	.....	$264
Beverages	50	$519	1,257
Canning and Preserving	.....	.....	80
Confectionery	.....	.....	.....
Grain Mill Products	40	40	160
Ice Manufactured	40	.....	80
Meats and Meat Products	.....	40	80
Milk Products	165	40	281
Miscellaneous	295	315	469
	$630	$954	$2,671

Commodity Prices Unchanged in Month

General commodity prices failed to respond in the month from mid-February to mid-March to the prospects of a spring upturn in business. Continued suspicions of trouble in Europe combined with a watchful attitude toward the domestic political situation to counterbalance the real prospects for better construction and manufacturing levels. The weighted commodity price index compiled by the *New York Journal of Commerce* stood at 75 on Feb. 1 and again at 75 on the thirteenth of March.

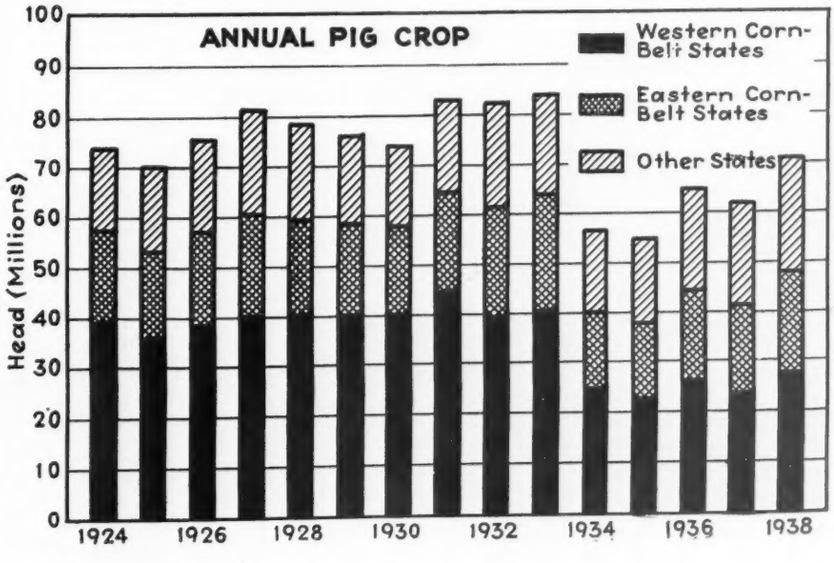
Food prices, in spite of some increases, registered a small decline for the four-week period, the index standing at 66.7 on Feb. 14 and 66.0 on March 13. Wheat, No. 2, hard winter, fell from 66½ cents on Feb. 14 to 66¼ cents on March 14. Flour was off 10 cents per bbl. to $4.55 in the same period. Beef dropped from 16½ cents to 16 cents in the month, lamb fell from 18 cents to 15 cents, and pork loins dropped from 18 cents to 17 cents. Butter dropped from 26¼ cents to 22½ cents, but cheese, in contrast, rose from 13½ cents to 14¼ cents. Sugar and cocoa also registered increases, while coffee showed a small decline.

Fats and Oils Production Reaches High Levels

Domestic production of facts and oils in 1938, from domestic and imported materials, reached the highest level recorded since 1929, according to reports of the Bureau of Agricultural Economics. This production exceeded 8,500,000,000 lb. in 1938, an increase over 1937 of more than 6 per cent. The Bureau reports that this increase results from greater production of domestic vegetable oils, as imports of foreign vegetable oils and production of domestic animal oils and fats both decreased.

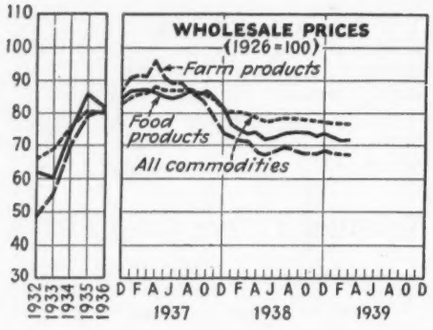
Weather Favors Crop Yields

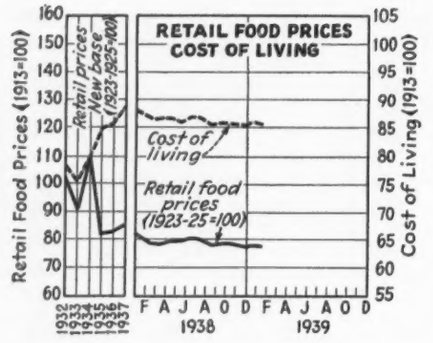
Precipitation for the three winter months this year was above that recorded in 1938 and was more uniformly distributed. As a consequence, the spring planting season of 1939 will start with an abundant supply of moisture in the soil of most growing areas in the United States, except in Florida and the Southwest. While the supply of moisture in the subsoil of the Plains States is still below normal, the recovery from the extreme dry subsoils of the drought areas continues. In addition, the winter weather throughout the country was warm and mild, with abundant snowfall, and therefore favorable to good crop yields.



Smaller Pea Acreage Is Expected for 1939

Plantings of peas for manufacture in 1939 will be 16 per cent below the 1938 acreage, according to reports made to the Bureau of Agricultural Economics. The acreage forecast for this year totals 280,720 acres, comparing to 333,820 acres planted last year. This acreage is expected, with normal yields, to give an output of around 200,000 tons for canning and freezing. Output to be frozen this year is expected to show an increase, with all of the decrease reflected in the yield of canned peas. However, with the large carry-over of canned peas from 1938, the supply of this staple in 1939 is expected to be around 27,000,000 standard cases, some 6,000,000 cases above the expected consumer demand.


WHOLESALE PRICES
(1926=100)
Farm products
Food products
All commodities
1932 1933 1934 1935 1936
D F A J A O D F A J A O D F A J A O D
1937 1938 1939



Wine Production Lower

Production of wine in California in 1938 is estimated by the Wine Institute at 56,526,000 gal. This is a drop of about 34 per cent from the 83,351,000 gal. produced in 1937. Sweet wines still lead, accounting for 35,764,000 gal., compared to 20,761,000 gal. of dry wines.

INDICATORS

FLOUR PRODUCTION in February, 1939, as reported by *The Northwestern Miller* for mills representing 60 per cent of U. S. production, was 5,140,395 bbl., compared to 4,863,569 bbl. in February, 1938.

CONFECTIONERY and competitive chocolate product sales in January, 1939, were $15,899,000 compared to $15,949,000 a year before.

OLEOMARGARINE SALES in January, 1939, as indicated by sales of revenue stamps, were 30,019,440 lb., compared to 42,254,842 lb. in January, 1938.

BUTTER PRODUCTION in January, 1939, was estimated by the Bureau of Agricultural Economics to be 128,303,000 lb., compared to 116,675,000 lb. in January, 1938, and a 1930–1937 January average of 115,733,000 lb.

CHEESE PRODUCTION in January, 1939, was estimated by the Bureau of Agricultural Economics at 28,171,000 lb. This was 4 per cent below January, 1938, production but 15 per cent over the January average of the years 1930 to 1937.

EVAPORATED and condensed milk produced in January, 1939, totaled 132,873,000 lb., according to the Bureau of Agricultural Economics.

FROZEN FRUITS in storage, March 1, 1939, totaled 103,189,000 lb., compared to 110,828,000 lb. on March 1, 1938, and a 1934–1938 average for the date of 66,922,000 lb.

FROZEN VEGETABLES in storage on March 1, 1939, amounted to 55,525,000 lb., compared to 25,992,000 lb. on March 1, 1938.

BUTTER, creamery, in storage, March 1, 1939, was 92,800,000 lb. This compares to 21,033,000 lb. on March 1, 1938, and a 1934–1938 average for the date of 18,978,000 lb.

CHEESE, all kinds, in storage on March 1, 1939, totaled 91,625,000 lb., compared to 85,656,000 lb. on March 1, 1938, and a March 1 average in 1934–1938 of 79,261,000 lb.

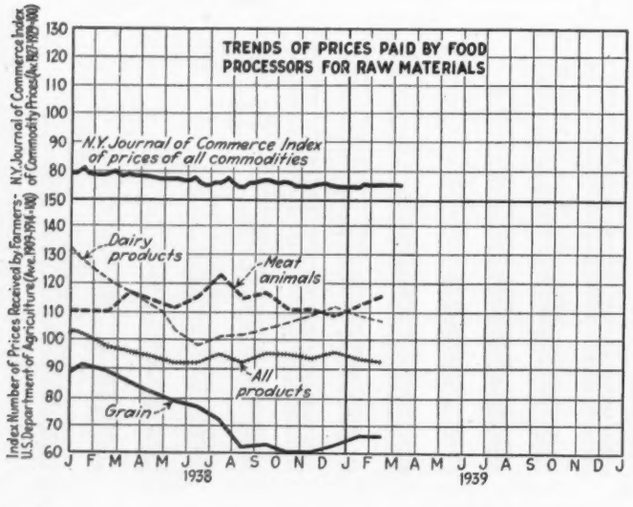
EGGS, case equivalent, in storage on March 1 of this year equaled 1,435,000 cases, compared to 2,817,000 cases on March 1, 1938, and an average in 1934–1938 for March 1 of 1,566,000 cases.

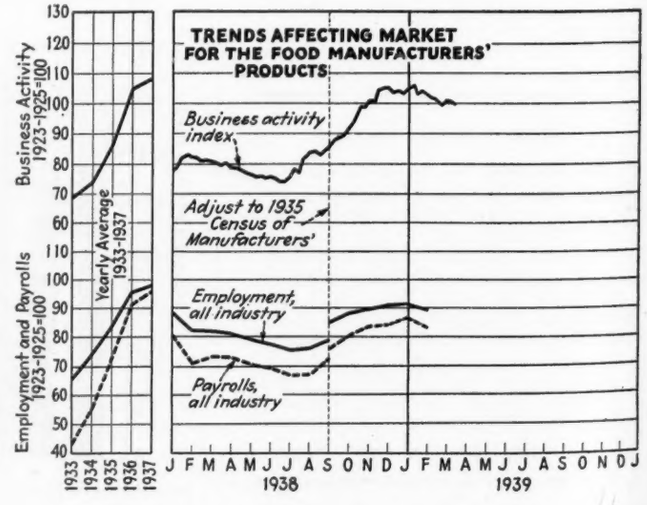
POULTRY, frozen, all kinds, in storage on March 1, 1939, totaled 116,300,000 lb. This compares to 100,493,000 a year before and an average for the date in 1934–1938 of 110,539,000 lb.

MEAT, all kinds, in cure and storage on March 1 of this year was 659,750,000 lb., compared to 720,979,000 lb. a year before and a 1934–1938 average for March 1 of 829,716,000 lb.

LARD in storage on March 1, 1939, was 125,372,000 lb., compared to 116,979,000 lb. on March 1, 1938, and a 1934–1938 average for the date of 136,884,000 lb.

WEEKLY FOOD INDEX of Dun & Bradstreet stood at $2.34 on March 7, 1939, up from $2.30 on Feb. 7, but 6.5 per cent below the figure for the comparative date in 1938.


TRENDS OF PRICES PAID BY FOOD PROCESSORS FOR RAW MATERIALS
N.Y. Journal of Commerce Index of prices of all commodities
Dairy products
Meat animals
All products
Grain
Index Number of Prices Received by Farmers: U.S. Department of Agriculture (Ave. 1909-1914=100)
N.Y. Journal of Commerce Index of Commodity Prices (Ave. 1867-1877=100)
J F M A M J J A S O N D J F M A M J J A S O N D J
1938 1939


TRENDS AFFECTING MARKET FOR THE FOOD MANUFACTURERS' PRODUCTS
Business activity index
Adjust to 1935 Census of Manufacturers'
Employment, all industry
Payrolls, all industry
Business Activity 1923-1925=100
Employment and Payrolls 1923-1925=100
Yearly Average 1933-1937
1933 1934 1935 1936 1937
J F M A M J J A S O N D J F M A M J J A S O N D J
1938 1939

Men, Jobs & Companies

INDUSTRY

Abraham Bros. Packing Co., Memphis, Tenn., will spend $40,000 to modernize its packing plant.

Columbia River Packers Association is constructing a cold storage plant at Astoria, Ore., to permit more extensive tuna canning operations. The company is putting in equipment at its cannery in Elmore, Ore., for tuna canning.

Drovers Packing Co. has purchased the Ottawa (Ill.) Packing Co. and it is planning construction of a $50,000 wholesale plant at Chicago. Slaughtering operations will be centered at Ottawa.

Fenn Bros., Inc., Sioux Falls, S. D., has acquired John G. Woodward Candy Co., Council Bluffs, Iowa.

General Foods Corp. will build a four-story brick and concrete building as an addition to its Hoboken, N. J., plant for the manufacture of coffee containers. To cost about $250,000, the plant will be ready for operation about Aug. 1.

Loblaw Groceterias, Inc., will build at Buffalo a $100,000 bakery with a capacity of 12,000 loaves of bread for each eight-hour shift.

Loose-Wiles Biscuit Co. is erecting a new plant in Detroit. It will be ready for production in April.

M. & C. Food Products Co., Chicago, has started work on a plant which will cost approximately $100,000.

R. I. MacLaughlin & Co. is building in Beaverton, Ore., a factory which will be used to cold pack small fruits and berries.

National Biscuit Co. will build a $2,000,000 plant at Atlanta, Ga., which will be laid out for efficient straight-line production. Band type ovens will be installed. Heavy demand in the Southeast which has kept the old Atlanta plant operating at full capacity for some months caused the company to plan this expansion.

Oscar Mayer, Madison, Wis., has purchased half interest in Milner Provision Co., Frankfort, Ind. Mayer will spend $65,000 to expand the production facilities of the Milner plant.

John Morrell & Co. is remodeling its beef slaughterhouse and is constructing an eight-story steel and concrete building to replace its old pork storage plant.

ANDREW E. HOLMES

He has been elected president of Angostura-Wuppermann Corp., New York, succeeding Stuart G. Gibboney, who has become treasurer and chairman of the board. Mr. Holmes had been vice-president of Donahue & Coe, Inc., advertising agency.

Northwestern Candy Co. is rebuilding in Des Moines, Iowa, the plant which was damaged by fire early in February to the extent of $107,000.

Perfection Biscuit Co., Fort Wayne, Ind., has let the contract for a new $150,000 addition to its bread baking plant.

Phillips Packing Co., Cambridge, Md., has purchased two canning plants at Cordova and Willoughby, Md.

Southern Dairies is building a new plant at Cambria, Va., to replace one destroyed by fire last September.

Speas Co., Kansas City, is constructing an $80,000 vinegar plant in St. Paul.

Supplee-Wills-Jones Milk Co. is spending $150,000 to modernize its plant at Chambersburg, Pa.

United Frosted Foods, Inc., Chicago, has been formed to enter the quick-frozen foods field. The company will market its own line of nationally advertised frosted foods through wholesale distributors. The president is Edward W. Rosenheim, for twenty years head of North Shore Food Products Co., Chicago.

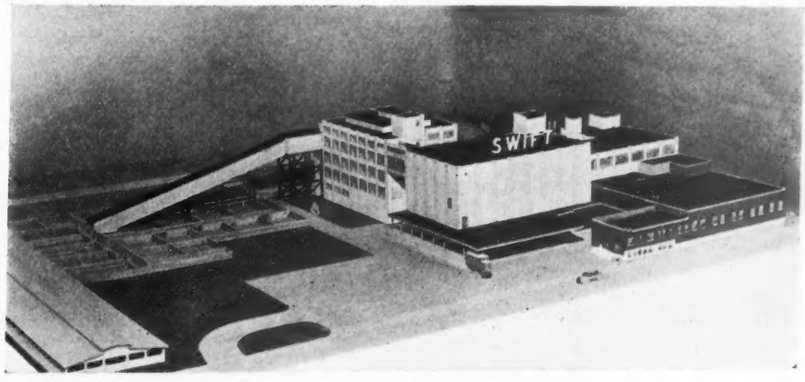
Utah-Idaho Sugar Co. has launched one of the most extensive maintenance and improvement programs in its history in eleven factories of Utah, Idaho, Montana, South Dakota and Washington.

PERSONNEL

E. F. Anderson has been appointed general manager of Schepps Brewing Corp., Dallas, Tex. He formerly was a sales executive with United Fidelity Life Insurance Co.

Harrell Ashburn, Fort Worth, heads up Texas Ice Cream Manufacturers Association for the coming year.

V. C. Christiansen, Bowman Dairy Co., is the new president of Chicago Dairy Technology Society.



WEST COAST MEAT PLANT

Model of Swift & Co. plant which is being built at Los Angeles, Calif.

Henry H. Cooper has been advanced to the presidency of Jamestown (N. Y.) Bottling Co., Inc., succeeding the late Philip F. Simon.

Lewis A. Cushman, Jr., has been elected chairman of the board of Purity Bakeries Corp., Chicago.

Herman Dietz, manager of the Springfield (Mass.) plant of Hathaway Bakeries, Inc., has become plant manager at Worcester. Charles Shields has been shifted from Pittsfield to Springfield as plant manager.

E. W. Distelhorst has been elected president of Franklin Brewing Co., Columbus, Ohio.

M. J. Donnelly, general counsel of Brewing Industry, Inc., has been granted the 1938 achievement award of Master Brewers' Association of America.

Joe Eros, Coca-Cola Bottling Co. of Birmingham, heads up Alabama Bottlers of Carbonated Beverages.

Robert Gile, superintendent at the Prairie (Ill.) plant of United Milk Products Co., has been named to a similar position at the Elkhorn, Wis., plant. He succeeds Harry E. Wolters who has become general manager of Darien (Wis.) Milk Co., Inc.

Harold M. Grout has been placed in charge of Canadian operations of the Nestle's Milk Products, Ltd., Canada, following the resignation of Bradford Ellison.

R. L. Hardy, Nashville, is the new president of the Tennessee Dairy Products Association.

George F. Hutter, of Louis Ziegler Brewing Co., Beaver Dam, Wis., heads the newly formed Badger State Brewers' Association.

Sigurd Krogstad, Milwaukee, has been elected president of the Wisconsin Bottlers of Carbonated Beverages.

Robert A. Lewis, Standard Brands, Inc., Boston, will serve as the 1939 president of the Tea Association of the United States of America.

Gabriel Lowenstein has been elected chairman of the board and Leo Green, president, of Fred Fear & Co., Brooklyn, N. Y.

Allen E. Lusk, general manager of Davenport Candy Co. for the past four years, has purchased the company for a reported sum of $135,000.

H. S. Mitchell has become assistant chief chemist of Swift & Co., Chicago.

Paul Morton, city manager of Trenton, N. J., for the past four years, has been appointed assistant to William B. Stokely, Jr., president of Stokely Brothers & Co., Indianapolis.

Andrew E. Nelson has been advanced to the presidency of Adolf Gobel, Inc., Brooklyn, N. Y., after having been named vice-president only recently. He succeeds Frank M. Firor, who has resigned because of ill health.

DR. WILLARD D. BIGELOW

Director of the research laboratories of National Canners Association since 1918, he died March 6 at the age of 72. He first joined the NCA laboratories in 1913 as chief chemist. Prior to that he was with the Bureau of Chemistry of the Department of Agriculture. Dr. Bigelow distinguished himself as a chemist, and on his researches progress in the technology of the canning industry was built. He is shown here with F. F. Fitzgerald.

Russell Nolte succeeds Fletcher Goodrich as manager of the Pet Milk Co. plant at Hudson, Mich.

Dr. Curtis Norton, formerly director of research of the Charles A. Krause Milling Co., Milwaukee, is now connected with research at Corn Products Refining Co., Argo, Ill.

Wilson C. Price has been named president of Jamestown (N. Y.) Baking Co.

Rudolph B. Prinz has been appointed vice-president in charge of production of Rahr Malting Co., Manitowoc, Wis., succeeding Frank A. Miller, retired.

Joseph W. Rezabek, superintendent of International Milling Co., Buffalo, N. Y., heads up District No. 8 of Association of Operative Millers.

Gordon Roberts has been made vice-president of Roberts Dairy Co., Omaha.

Douglas E. Scalley, general agricultural superintendent for Utah-Idaho Sugar Co., has been named vice-president and general manager to succeed the late Willard T. Cannon.

Alice Tippett has been elected president of the board of directors of the International Mate Co., Inc., New York.

C. P. Wilson has been advanced from assistant general manager to manager of the products department of California Fruit Growers Exchange.

DEATHS

Warren S. Adams, 54, president and general manager of St. Lawrence Dairy Co., Reading, Pa., Feb. 15.

Fred W. Brigham, 63, vice-president of United Chocolate Refiners and superintendent of the Mansfield, Mass., plant, March 13.

Thomas F. Bryce, 43, president of Horton Pilsener Brewing Co., New York, and former vice-president and general manager of Krueger Brewing Co., Newark, March 11. He was one of the first advocates for the sale of beer in sealed cans.

George H. Fritz, 80, formerly president of New Jersey Ice Cream Co. and of George H. Fritz & Sons Candy Co., and previously head of ice cream and dairy firms in Mansfield, Pa., and New Hampton, N. Y., March 4.

Charles Harding, 79, formerly director of National Dairy Products Corp., New York, and founder and former president of Harding Cream Co., Omaha, at Los Angeles, Feb. 27.

Chauncey A. Jones, former vice-president and secretary of Capital Food Co., Tiffin, Ohio, recently.

Horace K. Seybolt, 71, president of Geneva (N. Y.) Preserving Co., Feb. 22. He started as a stenographer with the company in 1892.

William P. Uhler, 84, former vice-president of A. F. Ferris & Co., New York meat packers, at Mount Vernon, N. Y., Feb. 14. He retired in 1926 after 47 years with the company.

ASSOCIATED INDUSTRIES

American Can Co., New York, has appointed Leonard D. Jenkins as assistant to the general manager of sales, packers cans. H. H. Howry has been made Baltimore district sales manager, packers cans.

Cans, Inc., has been formed with headquarters in Chicago to manufacture general line containers. R. S. Solinsky, formerly assistant vice-president of National Can Corp., is president.

International Harvester Co. is spending approximately $3,000,000 to modernize its Milwaukee plant.

Research Consultants, Inc., has opened offices in New York and will conduct research on fundamental questions concerning foods, drugs and cosmetics.

Sprout, Waldron & Co., Muncy, Pa., announces that H. K. Worthington will represent the company in both eastern and western New York.

Conditions Affecting Capacity

(*Continued from page 197*)

mix temperature on freezer capacity, assuming that the refrigerant temperature is held constant. It is of note that the raising of the mix temperature from 35 deg. F. to 50 deg. F. reduces the capacity only 12.5 gal. per hour on a 150 gal. per hour operation. The small reduction is accounted for because with the higher temperature mix there is a higher temperature differential between the mix and the refrigerant, giving a compensating increase in rate of heat transfer. It is important to note, however, that much more refrigeration capacity is required of the compressor, with the high mix temperature; and in practice, if the compressor does not maintain the normal refrigerant temperature in the freezer jacket, the capacity of the freezer may be seriously reduced by the use of high mix temperatures. As a practical observation, it has frequently been noted that mix temperatures higher than 50 deg. F. reduce the quality of body and texture of ice cream produced. High mix temperature may cause poor melting of the ice cream.

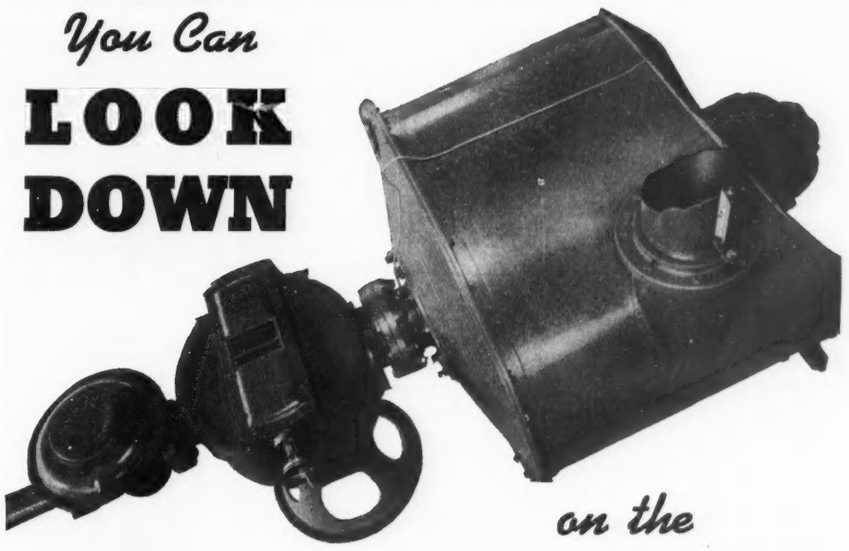
Fig. 5 shows the effect of ice cream drawing temperature on the capacity of an ice cream freezer, assuming a refrigerant temperature of 10 deg. F. and a mix temperature of 40 deg. F. It should be noted that as the drawing temperature becomes lower, the capacity of the freezer drops rapidly on account of the added heat units required per pound of ice cream, the increased power requirements, and the smaller temperature differential between the refrigeration and the ice cream in the freezing cylinder.

The refrigeration capacity of a freezer is its principal capacity-limiting factor, as pertains to the weight of ice cream it can turn out per hour. However, the actual gallons of ice cream turned out is largely affected by the amount of air in the ice cream, as expressed in overrun. Thus, if a freezer is capable of freezing 75 gal. of mix per hour, the output of ice cream from this mix will be 112.5 gal. per hour at 50 per cent overrun, 150 gal. per hour at 100 per cent overrun, and 180 gal. per hour at 140 per cent overrun. Fig. 6 illustrates the effect of overrun variation upon the capacity of a freezer, assuming that all other conditions of operation remain unchanged. This is of practical value in that it explains why the output of a freezer will not always be the same if cream of a different overrun is drawn. It also explains one reason why the capacity of a freezer is less on ices and sherbets of low overrun than on normal ice cream.

It is evident from a study of these graphs that, in the operation of a continuous freezer, such factors as ice cream mix temperature, mix composition, ice cream drawing temperature, the refrigerant temperature, and the overrun all appreciably affect the capacity of the freezer, and should be considered in the operation of such machines. The exact effect of each of these factors can readily be estimated from the graphs shown, or similar ones prepared for a particular mix composition. Their combined effect determines the total capacity of the freezer for a given mix and set of freezing conditions. Reference to the graphs enables a manufacturer to determine what effect, if any, a change in these factors will have for a given drawing.

You Can

LOOK DOWN



on the

INDUSTRIAL CARBURETOR

. . . but No One Does!

No, sir . . . not when it saves money, saves fuel and permits more rigid standards of quality and uniformity in baking, roasting, high temperature cooking and can making.

At this very moment Kemp Industrial Carburetors are premixing gas and air for *complete* combustion (without secondary air at the burners) in scores of the nation's greatest food plants . . . and saving from 15 to 50 per cent in fuel over previous heating methods. More savings look just as good to the comptroller as more sales. You are cordially invited to investigate. Write The **C. M. Kemp Mfg. Co., 405 East Oliver Street, Baltimore, Maryland.**

KEMP of BALTIMORE

Continuous Process

(*Continued from page 192*)

of the fruit and sugar at a temperature below the boiling point of the liquid (see Fig. 6). Next, when the requisite inversion has taken place, the material is rapidly concentrated under vacuum at 140 deg. F. At the end of the concentrating period, the temperature is increased to the atmospheric boiling point prior to filling into cans or jars.

Case VII—*Invert-Evaporate-Invert*

To go one step further in the graphic analyses of all the stunts that can be done when everything is under control, consider a hypothetical production problem where conceivably it is desired to invert a part of the sugar, then evaporate a part of the liquid and finally complete the inversion. The graph for this operation is shown in Fig. 7. At the moment, one cannot foresee any real need to perform this split inversion in this manner, but by having everything under control, it could be done.

Other theoretical possibilities can be graphed by anyone who understands the principles involved and is in possession of the complete control that is possible in carrying out a continuous operation.

The foregoing graphic analyses merely indicate that the manufacturer of jelly (or other products requiring boiling and hydrolysis in whatever order or sequence needed) has a new tool available in the continuous process that will give him complete control over his operations.

Practical Application of Continuous Processing

After the mental concept of various steps of control has been gained, and the proper graphic analysis of the needs of a product has been made, then comes the problem of designing equipment to perform the task in a continuous manner. The design phase of the matter is omitted from this discussion.*

A practical application of the continuous method is found at Minot Food Packers, Hammonton, N. J., where it is operating on cranberry sauce. Here is found a practical comparison of the batch method (Case I) and the continuous method (Case III).

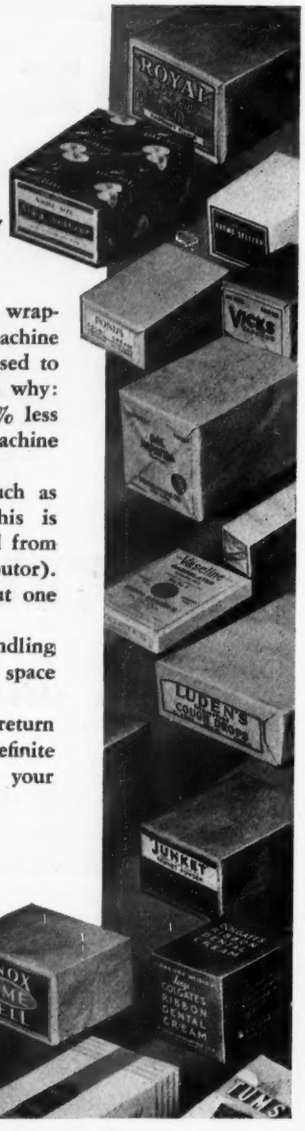
Batch Method

Cranberries are prepared for manufacture by harvesting, washing, separating the sound from the soft ones, blending and mixing. Then they are cooked with the proper amount of water in a 100-gal. steam jacket kettle. Each batch contains 100 lb. of berries. When the cook is finished, the batch passes through a pulping machine to separate the seeds and skins from the juice, which is called cranberry pulp. This strained "pulp" has a density of 11.5 deg. Brix and pH of 2.5. It is then pumped to the battery of twelve steam jacketed kettles of 50 or 100 gal. capacity, shown in the photograph. A weighed amount of sugar is added to a measured amount of the hot pulp in the kettle and mixed with a paddle to dissolve it as rapidly as possible. Then the steam is turned on and the liquid is concentrated by boiling as rapidly as possible (within eight minutes) to 41 deg. Brix. Steam pressure in the kettle jacket is 85 lb. per sq.in. Any scum forming during the boil is removed in order to obtain a clear product.

With the foregoing equipment, Minot Food Packers Co. are able to produce 1,400 gal. per hour of cran-

* A continuous jelly machine designed by the author, for which several patent applications are pending, has been installed at Minot Food Packers plant.

Your Next Step
in lowering packaging costs



For the manufacturer using automatic cartoning or wrapping machines, the next logical step to lower costs is machine bundling. . . . And a bundling machine need not be used to capacity in order to show striking savings. . . . Here's why:

The strong, heavy paper used for bundling costs 60% less than made-to-order boxes. So right from the start, machine bundling makes this striking saving on *material costs.*

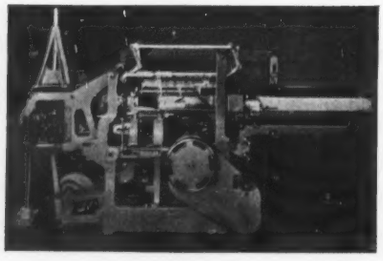
On top of that, bundling paper weighs 1/3 as much as boxes—reducing *transportation costs* all around (This is actually a double saving as containers must be shipped from box factory to you, and then from your plant to distributor).

Labor cost is also reduced—the machine requires but one operator to do the work of many packers.

A fourth saving is on floor space. Users of our bundling machine have saved as much as 50% of the floor space formerly required for packing.

Send us a number of your packages and we will return them to you bundled on our machine, along with definite figures on machine bundling costs to compare with your present costs.

Literature on request



PACKAGE MACHINERY COMPANY, Springfield, Massachusetts

NEW YORK CHICAGO CLEVELAND LOS ANGELES

Peterborough, England: Baker Perkins Ltd. Melbourne, Australia: Baker Perkins Pty., Ltd.
Mexico, D. F., Apartado 2303 Buenos Aires, Argentina: David H. Orton, Maipu 231

PACKAGE MACHINERY COMPANY

Over a Quarter Billion Packages per day are wrapped on our Machines

berry sauce from the twelve kettles. It requires nine operators for the cooking and handling of the sugar and cranberries. Furthermore, it requires 400 batch cooks per eight hours. In other words, it requires 400 repetitions of charging, discharging, boiling, skimming, weighing, mixing and many other functions. And highly skilled labor is needed to assure good results.

Yet no matter how careful an operator is, however, owing to the large number of motions he must make, it has been necessary to regard as satisfactory a product having variations in the (solid) contents of ± 2 deg. Brix. A variation of 2 deg. Brix, up or down, from the desired 41 deg. Brix end-point does not appear to be very great. But in reality it influences the consistency of the jelly. Not only this, it also raises or lowers—as the case may be—the invert sugar content of the jelly with the inevitable effect on the quality of the product which has been previously explained. Experiences such as have been enumerated here can be duplicated many times in those encountered in other manufacturing establishments.

Continuous Operation

Compare the two photographs. In the second, showing the continuous operation, only one operator and a refractometer are required for the production of the same quantity of product that is produced in the twelve kettles by the batch process.

The continuous process operates on the principle that each necessary function is carried on without disturbing or unduly influencing any other function. Evaporation, inversion, coagulation of organic compounds, can be regulated at will.

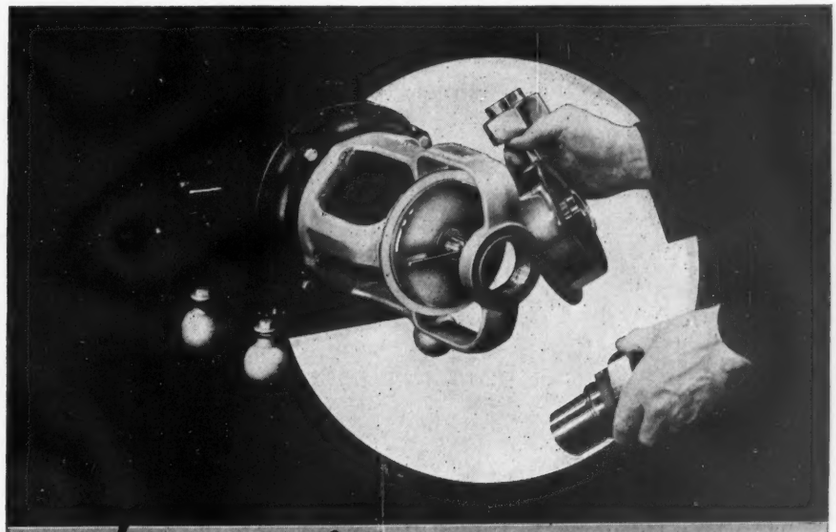
A proportioning device feeds the exact amounts of sugar from a bin and cranberry "pulp" from a constant feed tank into the evaporator. In the present example, it has been found advisable to utilize a design of equipment to operate at atmospheric pressure. The advantage of this choice is that cooking under atmospheric pressure imparts a certain tang and accentuates the real cranberry flavor of the finished product.

The mixture of sugar and "pulp" is charged into an elongated, narrow, jacketed copper kettle or evaporator. One end of the kettle or evaporator which receives the mixture of sugar and pulp is not jacketed. This permits dissolving the sugar at that end without caramelization. A baffle plate, provided with proper openings permits the clear fruit syrup—but not the undissolved sugar—to pass from the mixing section to the cooking section of the evaporator.

The capacity of this evaporator is regulated by variable weirs so that it is possible to control the time-factor, or time of evaporation (passage through the evaporator), with variable rates of production or rates of feeding.

In this piece of equipment, only two minutes are needed to evaporate the necessary amount of water. To comprehend this short evaporating period, it is necessary to take into consideration the fact that part of the water will combine with the sugar to form invert sugar, thus increasing the density of the liquid without actual evaporation.

The evaporator is provided with steam jacket and a heating element especially designed to permit very rapid evaporation. Material flows



Stainless FLEXFLO PUMPS *are easy to take apart*

CHERRY-BURRELL builds these pumps for positive, easy sanitation. The milk casing is of rolled, polished, pressed stainless steel — in two parts. Unscrew the sleeve and draw it out — then lift off the front half of the milk casing — lift out the stainless steel impeller — draw the rear half of the casing off the motor shaft — and there you are! And a Rotary Seal further safeguards and simplifies sanitation.

Casings are mounted direct on the standard splash-proof, ball bearing motor — there are no bearings in the casings and no outboard bearings — there are no base plates. Three sizes give capacities of from 1,000 to 100,000 pounds per hour. Ask your Cherry-Burrell representative about them. CHERRY-BURRELL CORPORATION, 427 W. RANDOLPH ST., CHICAGO.

through the evaporator continuously and agitation is maintained in such a manner that the liquid is carried slowly forward, thus assuring a uniform rate of evaporation. Also, it should be mentioned that there is ample time for the coagulation of organic compounds which form the scum. After cooking, when the necessary amount of water has been evaporated, only part of the required amount of sugar has been inverted. In order to bring about the further inversion which is necessary, the liquid flows into the inversion tank, in which the inversion is completed, whereby the density is further increased. This part of the process is completed *below the boiling point of the liquid.*

At a certain pH and temperature, the rate of inversion is constant, Therefore the inversion tank can be so designed that the sugar in the concentrated liquid is 75 per cent inverted, requiring six minutes to reach this point. Zigzag passages in the inversion tank prevent the mixing of the incoming and outflowing liquid, and agitator blades provided at the proper height keeps the liquid moving and facilitate separating the coagulated product from the liquid. This permits the continuous draining off of a clear, transparent product. A jacket is provided for the inversion tank and the condensate from the evaporator jacket is sufficient to maintain a correct uniform temperature for the inversion of the sugar. The finished product from the inversion tank, having a temperature of 200 deg. F., is put into enameled tin cans and sealed while it is hot.

When designing this continuous evaporator, a working jacket-pressure of 85 lb. per sq.in. was considered and incorporated in the design, as this is a figure that is usually considered necessary for the batch-operated jacketed kettle. However, actual practice with the continuous jelly machine soon showed that a 40 lb. steam pressure in the jacket was entirely sufficient. And furthermore, because no additional steam is required for the heating of the inversion tank, the steam consumption has dropped 75 per cent below the amount needed for cooking in kettles.

One operator, working with the continuous evaporator and the inversion tank apparatus, gives the same production as that previously secured by twelve batch kettles and nine men, and gives a product having a variation of only ± 0.1 deg. Brix against a ± 2 deg. Brix with batch kettles. All of which materially reduces manufacturing costs as well as improves uniformity of quality. A reading of 0.1 deg. Brix is possible only with a refractometer.

The disadvantages of cooking large batches at atmospheric pressure, wherein over-cooking nearly always occurs, are avoided in a continuous jelly machine. This is possible because the height of the liquid product in the evaporator is low, and the speed through the evaporator is very rapid. The design of the equipment is quite flexible and can be adapted either to vacuum or atmospheric pressure regulations.

In conclusion, I want to express my appreciation for the wholehearted support given by Messrs. W. H. Hoodless, Vice-President of Pennsylvania Sugar Co., Daniel Conway and John Kessler, owners of Minot Food Packers, Inc., and Arthur L. Simmers and Joseph Bowen, of the Pennsylvania Sugar Co., for the help given in the development of this process.

Reduce
YOUR MIXING COSTS THE SANITARY "LIGHTNIN" WAY

Replace Paddle Type Agitators

It has been repeatedly proved that LIGHTNIN Patented Double Action Propeller Type Mixing cuts power costs, reduces mixing time and entirely eliminates dead-spots. Complete line includes geared and direct drive portables, top entering and side entering mixers for mixing quantities from to one million gallons.
Completely sanitary. No pockets for bacteria. Easily cleaned with hot water or steam. Sanitary sealed out-board bearing prevents oil or grease from this source contaminating mix.

"Lightnin" Variable Speed Mixers operate from 100 to 1800 R. P. M.

"Lightnin" Portable Mixers (geared and direct drive) range in size from 1/30 to 10 H. P.

"Lightnin" Top Entering Units (geared and direct drive) for open or closed tank work including pressure and vacuum work.

"Lightnin" Side Entering Units for tanks up to 1,000,000 gals.

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Vinegar—Wines
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Premixing Mayonnaise and Salad Dressings
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MIXING EQUIPMENT CO., INC.
1043 Garson Ave., Rochester, N, Y.

MANUFACTURERS OF LIGHTNIN PROPELLER TYPE MIXERS

Frozen Bread

(*Continued from page 201*)

for supplying fresh bread through weekends and for the eliminating of premium night wages. What will take place in the retardation of staling of bread by freezing in the next ten years may be more surprising than what has been accomplished in the freezing and storage of other perishables.

The bread used in the research on freezing was made from a rather rich-formula dough into regular commercial 1¼-lb. loaves, uniform in composition and weight, throughout the tests. When placed in the freezer, the loaves were eight hours out of the oven. They were taken out of the freezer at the same time of day as they were put in. Approximately four hours were required to thaw them out preparatory to comparison with "fresh" bread. For these tests, "fresh" bread was bread twelve hours out of the oven to offset the twelve hours that the frozen bread was kept under room temperature. All of the bread was sliced and wrapped in commercial waxed paper unless otherwise identified.

The freezers located at Armour & Co. and Swift & Co., were of such a size that large batches of bread could be placed in them without affecting the temperature of the freezer. Sharp freezing methods were employed in all of the tests made. The temperatures employed ranged from –11 deg. C. to –35 deg. C. By means of thermometer readings (thermometer placed in the center of the loaf) it was found that all temperatures except –11 deg. C. were well below the range of maximum crystal formation.

The degree of staling of the bread was determined by flavor and taste tests and physio-chemical tests. Flavor and taste (organoleptic) tests were made as described by Cathcart[5] with the ballot changed as recommended by Platt.[1] This ballot is illustrated in Fig. 3. For general judging, the number and classification of judges participating were described previously.[6]

The physio-chemical tests were a modification of the swelling-power test as reported by Katz[3, 6] and the compressibilty test reported by Platt.[7]

The swelling-power method of Katz is based on the degree to which finely divided crumb of bread will swell in water and is as follows:

"Ten grams of bread crumb, together with an excess of water, is passed through fine bolting cloth (80 mesh per centimeter). The volume of the liquid (which is saturated with toluene in order to prevent fermentation) is raised to 250 c.c. and the mixture allowed to settle in a graduated glass of 250 c.c. capacity. After 24 hours, the volume of the decantate or deposit is read off. Upon shaking again, another 24 hours is alloweed for settling, a second reading made, and the mean of the two readings taken. The volume of the decantate is shown to be considerably larger for fresh bread than for stale bread, for instance, 52 c.c. compared with 34 c.c."

The laboratories of the Institute have found that it is much easier to put the bread crumb through a brass-frame, 200-mesh sieve of 5-in. diameter than through bolting cloth. The sieve has the additional advantage of fitting snugly on top of a 2-liter pyrex beaker, which serves to catch the washing. The crumb is rubbed through with the fore and second fingers. The apparatus needed is shown in the accompanying illustration. This modification of the Katz swelling-power method has been found to produce the same results as the original procedure.

The Platt compressibility method is described briefly as follows:

An apparatus similar to that used by Platt is

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illustrated. The apparatus is essentially a large balance with a plunger attached to the underside of the right-hand pan. A uniform piece of bread crumb (1½ in. thick) is placed on the dish under the plunger. A weight (about 200 grams) is placed on the right-hand pan and a chain weighing exactly the same on the left-hand pan. A 2-gram weight is then added to the right-hand pan; this is just enough extra weight to hold the plunger down lightly on the bread and to steady the pointer so that an initial reading can be taken on the scale. Then the chain is removed slowly by means of a string run over a pulley suspended overhead and attached to a windlass; 60 sec. after beginning to remove the chain a second reading is taken. The difference in the two readings gives the compressibility of the crumb. As the bread becomes harder, the compressibility readings become lower.

The compressibility test is much more likely to be affected by variations in the room temperature to which the breads are brought before testing than is the swelling-power test. A constant-temperature room was not available. For this reason, the data from the compressibilty test could not be given as much weight as those from the swelling-power method. In most cases, however, the compressibility tests showed the same trend as the swelling-power tests.

"Fresh" bread, bread out of the oven twelve hours before testing, was always tested along with the frozen bread. According to the results from the physio-chemical tests and from the organoleptic tests, the "fresh" bread samples were constant throughout the experiments.

At all temperatures employed, the physio-chemical tests showed the bread to be stale many days before the judges found it stale. Thus a very important result of this work is that the present physio-chemical methods, which are available for measuring staleness, do not agree with the opinions of consumers. And, in this connection, it must be remembered that the rating given by the judges is necessarily more important than that from the physio-chemical tests.

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[7] Platt, W., Staling of Bread. *Cereal Chemistry*, Vol. 7, p. 1, 1930.

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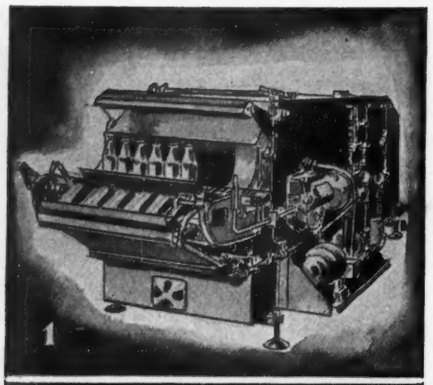

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Food Plants Cut Costs

(*Continued from page 204*)

plant that buys exhaust steam from a special turbine in a utility's generating plant. This steam, at 250 lb., operates a turbo-generator in the food plant powerhouse, from which steam is extracted at 125 lb. and 60 lb. and exhausted at 3 lb. as shown in Fig. 2. The turbine generates by-product power from this process steam, any deficiency in power being purchased from the utility. The utility turbine floats on the line and makes as much power as possible from the food plant steam demand, while the food plant turbine receives a credit of 16 lb. of steam per kilowatt hour, as well as power factor credits. The plant has fully automatic pressure and temperature control. Of paramount importance is a complete equipment of instruments, which provide indications for maintaining most efficient operating conditions and records for computation of all costs. A return of 55 per cent on the investment is calculated for this installation. Many other forms of cooperation with utilities have been worked out by food plants.

Part II of this article, to appear in a forthcoming issue of "Food Industries", will discuss methods of cutting costs in the distribution and utilization of steam and electric power and allied services, supplementing the discussion in Part I pertaining to analysis of steam and power costs.

How To Wash Bottles Clean

(*Continued from page 205*)

hydroxide for 5 minutes at 130 deg. F.

In Table I are shown the combinations of temperature, time and concentration of sodium hydroxide which would have the same germicidal properties as the standard just mentioned. Thus, if a soaker is being operated at 130 deg. F., but is speeded up so that the holding period is three minutes instead of five, it will be necessary to increase the concentration of alkali in the soaker solution to 2.9 per cent caustic in place of 2.16 per cent. On the other hand, if the soaker has a holding time of five minutes and is being operated at 140 deg. F., the concentration of the caustic could be reduced to 1.4 per cent.

It is desired to call attention particularly to the tremendous effect which temperature has upon the sterilizing efficiency of the soaker solution. On several occasions we have encountered soaker solutions whose temperature had dropped down to 110 deg. F. Reference to the table shows that with that low temperature it would be necessary to more than double the concentration of caustic; namely, it would have to be raised to 4.8 per cent if the germicidal efficiency equivalent to that of the 2.16 per cent at the stipulated temperature of 130 deg. F. were to be maintained. For every 10 deg. F. drop in temperature, it is necessary to increase the concentration of caustic approximately 50 per cent, and for every 10 deg. rise in temperature the concentration in caustic may be decreased 33 per cent.

Compliance with the ABCB standard does not, therefore, require strict adherence to a temperature of 130 deg. F., a holding time of five minutes and an alkali concentration of 3 per cent of which 60 per cent is caustic. On the contrary, this standard is very flexible, and with the aid of Table I the desired germicidal efficiencies may be obtained with other temperatures, holding times and concentrations.

During the past few years there have been placed on the market many new washing compounds for which, in some instances, specific claims of marked superiority as germicides have been made to the bottler. A number of these have been sent in to us by bottlers, and others have been submitted by manufacturers with the request that we ascertain their germicidal efficiency as compared with sodium hydroxide which we have been recommending as a basis of all washing compounds. Although many of these compounds are mixtures of sodium hydroxide and other chemicals, some contain little or no caustic.

It is, of course, impossible for the ABCB research and technical service to test all compounds which might be submitted because time and expense will not permit. There have been several compounds, however, which have been brought to our attention so frequently that a study was made of them and some of the results are submitted for your information.[2]

In connection with testing the compounds for their germicidal properties, it should be pointed out that some substances have a peculiarly specific germicidal power against certain kinds of organisms. Therefore, any results obtained must be considered as applicable only to the conditions under which the experiments were performed. In the following investigations, two organisms were employed. One is known in the bacteriological field as *Staphylococcus aureus* and is frequently employed for study-

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ing disinfectant properties. The other is known scientifically as *Bacillus metiens,* a very resistant organism which was obtained from beverages and has been employed repeatedly in our studies on the germicidal efficiency of bottle washing compounds.

In one series of experiments the *concentration* required to kill *Staphylococcus aureus* in ten minutes at a temperature of 98.6 deg. F. (body temperature) was determined for each washing compound. In another series of observations, the *time* required to kill this organism at body temperature when employing 1 per cent of the various compounds was determined. The third series of observations was concerned with determining the time necessary to kill 99.9 per cent of the very resistant *Bacillus metiens* at a temperature of 140 deg. F. when employing a 2 per cent concentration by weight of the test compounds. The results of these experiments are summarized in Table II. Compounds I, II and III have been offered for sale to the bottlers with the claim that they are superior as germicides to sodium hydroxide. A perusal of Table II discloses that a concentration of 1.5 per cent sodium hydroxide killed *Staphylococcus aureus* in ten minutes, whereas it required a concentration of 3.7 per cent of Compound I, 2.2 per cent of Compound II and 3.3 per cent of Compound III to produce a similar result. Compound IV was offered not as a substitute, but as an adjunct to caustic, and it will be noted that its germicidal properties were extremely low compared to sodium hydroxide.

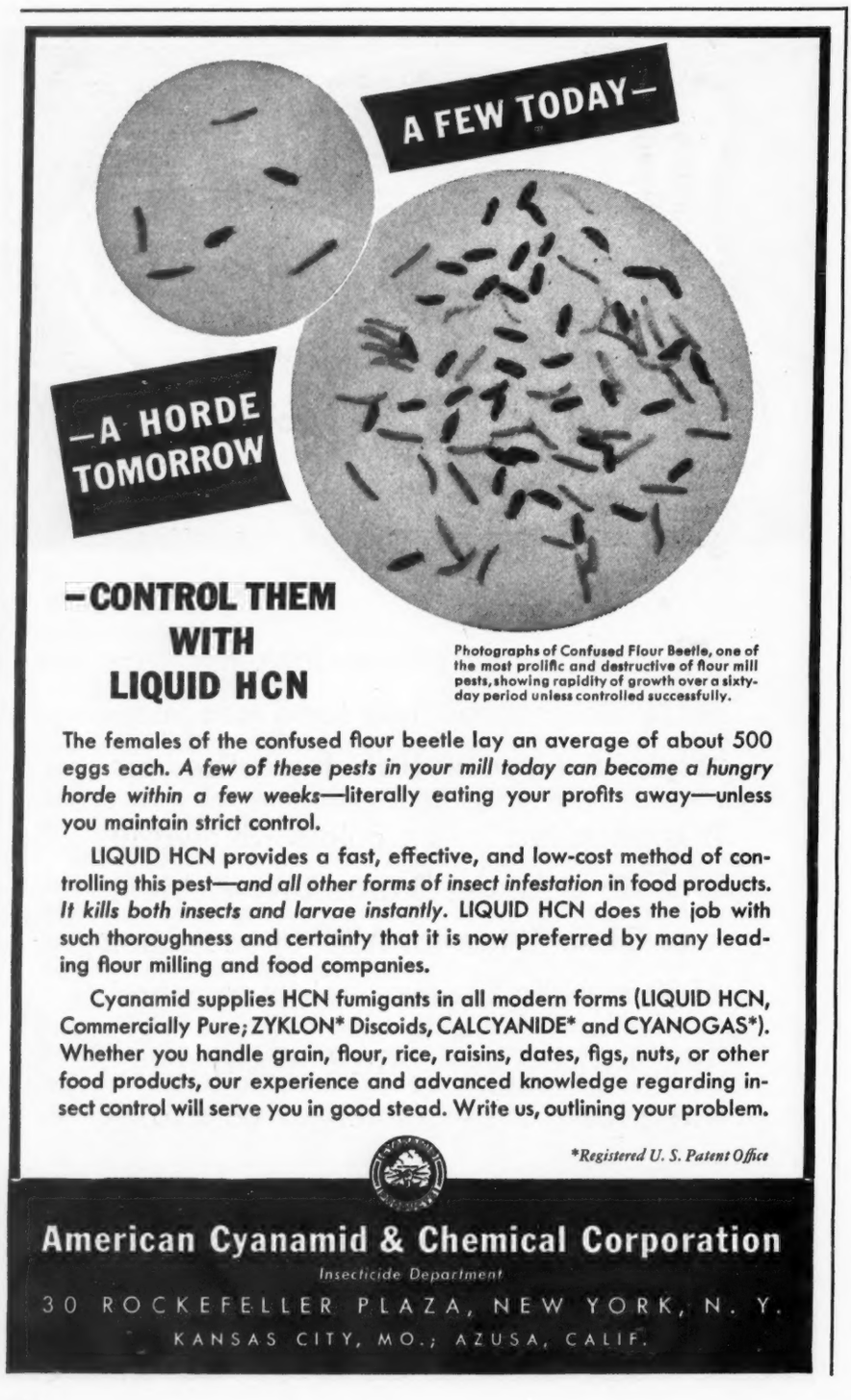
Considering the comparison on the basis of *time* necessary to kill 99.9 per cent of the exposed bacteria [*Staphylococcus aureus* when immersed in 1 per cent by weight of the various compounds at body temperature (98.6 deg. F.)] it is seen that sodium hydroxide required 2.5 minutes as compared with 15 minutes for Compound I, 7 minutes for Compound II, and 6.5 minutes for Compound III.

Employing a very resistant organism, the spore forming *Bacillus metiens* which has been referred to, the time required to kill 99.9 per cent at 140 deg. F., when the compound was present in a concentration of 2 per cent by weight, was 8 minutes for sodium hydroxide, 35 minutes for Compound I, 25 minutes for Compound II, and 22.5 for Compound III.

Whatever the merit of these compounds may be from the standpoint of cleansing properties, on the basis of these laboratory tests comparing compounds weight for weight they evidently are not as good germicides as is sodium hydroxide. Furthermore, these compounds were distinctly more expensive than the sodium hydroxide, and their relative germicidal efficiency was directly related to their caustic content. That is, those which had the higher caustic content were better germicides. An interesting coincidence was observed in the course of visits to plants this summer. The only plant which was found to be using one of the compounds discussed above in a concentration of 1 per cent as recommended by the washing solution salesman was also the only plant in which bottles taken off the line were found to be grossly contaminated with bacteria, yeasts and molds.

[1]This article is a resume of an address given by Drs. Levine and Arnold at a special meeting held in conjunction with the annual convention of American Bottlers of Carbonated Beverages, New York.

[2]These data are taken from an investigation carried on by Mr. M. Feldman under the direction of Dr. Max Levine.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Food Technology

(*Continued from page 216*)

The operator has only to lay a prepared test paper against a freshly cut surface of the butter. The paper contains a suitable dye, such as bromophenol blue, which instantly reveals any coarse water droplets. The spots on the test paper show the number, distribution and relative size of such droplets. Very fine droplets, on the other hand, do not visibly wet the test paper. Thus the test shows at once whether or not the sample has been worked sufficiently.

Digest from "A Method for Estimating the Size of Water Droplets in Butter," by S. Knudsen and A. Sörenson, *Fette und Seifen* 45, 669, 1938. (Published in Germany.)

Preserving Cream or Butter

A NOVEL SYSTEM for preserving cream as such, or converted to butter, involves recentrifuging pasteurized cream to a fat content of about 80 per cent or even higher, and deaerating by vacuum treatment in a thin film. As the invention is described in British Patent 493,445 (granted Nov. 3, 1938, to Svend H. Hartmann, Melbourne, Australia) the deaerated cream is agitated and hermetically sealed in cans which are then sterilized in an autoclave. Following this step, the cream may either be kept as such or converted directly to butter, depending on the cooling method.

Flash cooling, as by dipping in a chilled liquid, converts the cream in the cans to a granular butter. Slow cooling leaves the cream unconverted, so that it may be freshly churned to butter immediately before use if that is preferred.

MEATS AND FISH

"Stick" is Not So Hot In Diet for Pullets

SUPPLEMENTARY animal protein feeds, added to the basal diet for chickens, can be selected to give good support to egg production, with hatchability usually between 70 and 80 per cent. Liquid "stick" (concentrated liquor from steam rendering), either alone or mixed with bone meal, gives low hatchability, but meat meals are much better. Blood meal and bone meal can be used effectively in admixture with meat meal. All the tests were made with packing house byproducts, singly or in various combinations, to obtain data on the relative merit of such byproducts for feeding chickens. The results indicate that very satisfactory formulas can be developed for blending packing house byproducts, but that controlled conditions in preparing the products are needed for the sake of dependable quality.

Digest from "Effect of Packing House Byproducts in the Diet of Chickens on the Production and Hatchability of Eggs," by H. W. Titus, T. C. Byerly, N. R. Ellis and R. B. Nestler, *Journal of Agricultural Research* 53, 453, 1938.

Preserving Light Smoked Fish

IN TESTS with lightly smoked fillets of North Pacific fish (halibut, red cod, red snapper, gray cod, ling cod and spring salmon), the degree of spoilage was estimated by the bacterial count and the trimethylamine content. Before being smoked, the fish were immersed in brine containing a preservative such as benzoic acid. Only preservatives permitted under the Canadian Food and Drugs Act (1938) were used. After smoking, the fillets were wrapped in moistureproof transparent cellulose sheets, and then in brown paper. The stor-

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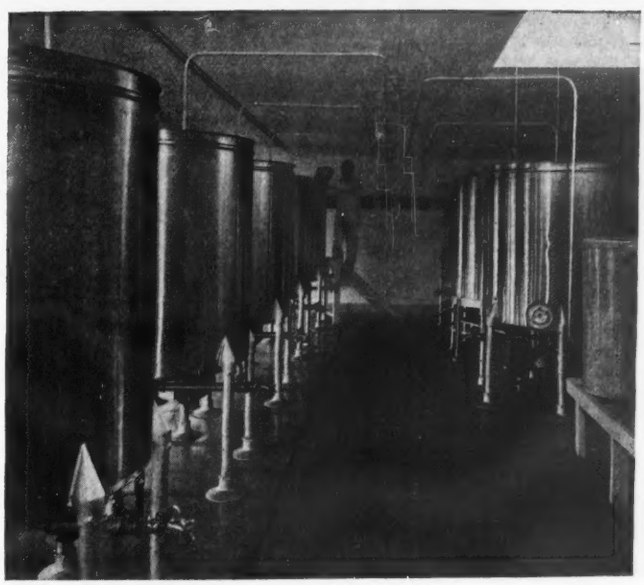

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age temperature was 33 to 36.5 deg. F.

The keeping quality of lightly smoked fillets is relatively poor. Whether or not the keepability is better than for untreated fresh fillets cannot be decided without additional information. Benzoic acid in the brine improves keeping quality, but the expectation that acidifying the brine with lactic or citric acid or with potassium acid phosphate would enhance the favorable influence of benzoic acid proved to be unfounded. Because there are so few permitted preservatives, a study is to be made of the drying treatment, variations in salt content, and irradiation with ultraviolet light as factors in keeping quality.

The relation between trimethylamine content and bacterial count is not constant and should not be relied upon for estimating one of these spoilage factors when the other is known.

Digest from "Preliminary Note on the Keeping Quality of Lightly Smoked Fish," by H. L. A. Tarr and P. A. Sunderland, *Progress Reports of Pacific Biological Station*, No. 37, p. 7, 1938 (Published by Fisheries Research Board of Canada).

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Storage Temperature More Important Than Rate of Freezing Halibut

A "TESTING PANEL" of three men and three women, meeting every other week at the Pacific Fisheries Experimental Station, Prince Rupert, B. C., has provided data for comparing fresh, frozen and stored halibut. Storage was in ice, for periods up to eleven days. Freezing was either: fast, in calcium chloride brine at –13 deg. F. with the center of the can passing through the critical temperature zone in about 22 minutes; or slow, in a storage room at –13 deg. F. with the center of the can taking 6.5 hours to pass through the critical zone. Size of ice crystals in the frozen fish was estimated from photomicrographs.

Stored halibut begins to lose its flavor appeal after a week, and in eleven days it is usually rated as off-flavor. Like beef and game, halibut flesh ages. When stored in ice, the prime age is five to seven days, although some prefer the somewhat stronger flavor developed a little later by enzyme action. The findings of the tasting panel indicate that quick freezing gives better results, but that storage temperature is a more influential factor than rate of freezing. On the other hand, rate of freezing is important, too. Indeed, if judged only by the appearance of the frozen and thawed samples instead of by taste, the rate of freezing is more important than storage temperature.

Digest from "Quality of Fresh, Frozen and Stored Halibut as Determined by a Tasting Panel," by O. C. Young, *Progress Reports of Pacific Biological Station*, No. 37, p. 12, 1938 (Published by Fisheries Research Board of Canada).

MARGARINE

Margarine Spoilage

IN A COMPARISON of milk, salt and quality of fat as factors in the spoilage of margarine, it was found that milk caused far more trouble than the others. Spoilage was judged according to changes in composition and on the less exact but equally important basis of flavor or palatability. Salt is less harmful than milk, but it is not by any means a preservative, as some consider it to be.

There is no answer to the contention that perfectly pure milk and salt will not hasten spoilage, since it is probable that they would not. But

this purity is not attained in practice.

Designating each type of deterioration by the class of compounds causing it, it may be said from the results of this study that milk (without salt) makes margarine soapy, aldehydic and strongly ketonic. Salt makes it peroxidic and strongly aldehydic. It is probable that traces of iron and copper, taken up by milk during handling and processing, are largely responsible for the harmful effect of milk. Use of second grade fat instead of best has only relatively small influence on margarine keeping quality.

Digest from "Margarine Spoilage. I. Effects of Milk and Salt," by Hans and Helene Schmalfuss, *Fette und Seifen* **45**, 479, 1938 (Published in Germany).

SUGAR

Ash Content and Color of Sugar

IN THE HOPE of finding a definite relation between the ash content of raw sugars and their color, some 400 samples were examined. Curves were plotted to show how ash content, color type and absolute color are related to each other. Relations were found, but the deviations from these relations were so numerous and unpredictable that no practical conclusions could be drawn which would be helpful in any way in judging raw sugar samples.

By confining the comparison of results to samples of like origin (all from the same sugar factory) it was possible in some cases to eliminate so much of the variability that definite relations appeared. In these instances, a fair degree of certainty could be achieved in estimating ash content from color, or assigning color values on the basis of ash content. Thus the comparison has a limited range of utility in the testing program of a single factory, but offers no general basis for testing raw sugars from various sources.

Digest from "Relations Between Color and Ash Content of Sugars," by O. Spengler and H. Hirschmuller, *Zeitschrift fur die Wirtschaftsgruppe Zuckerindustric* **88**, 827, 1938 (Published in Germany).

MISCELLANEOUS

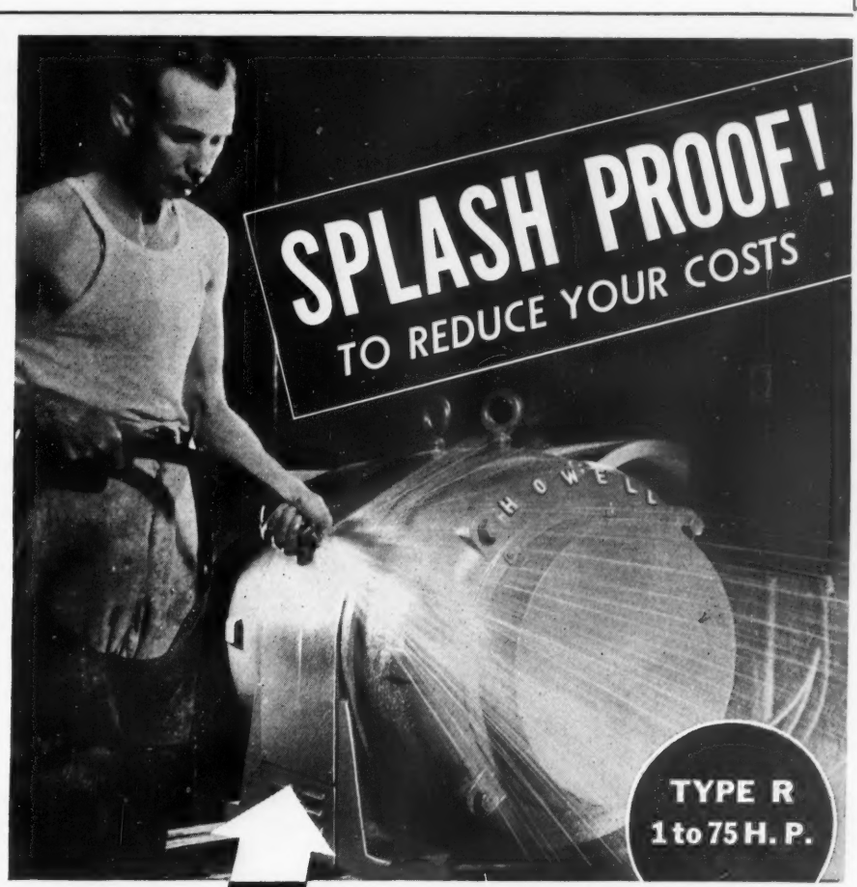
Keeping Qualities of Coffee Substitutes

STORAGE TESTS were made over a period of six months to ascertain why malt coffee keeps better than barley coffee (roasted barley). The experiments showed that oxidation processes had an essential part in the deterioration. This is in keeping with the fact that spoilage is fastest in thin layers exposed to air, slower in paper bags and slowest in metal containers. Plain roasted barley spoils most rapidly. Prepared barley coffee keeps better, and malt coffee still better. The results of a search for causes of spoilage indicate that the fat in malt coffee is chemically more stable than that in roasted barley or barley coffee.

Digest from "Storage Behavior of the Fatty Component in Barley and Malt Coffees," by K. Taufel and J. Kochling, *Fette und Seifen* 45, 491, 1938 (Published in Germany).

Enzymes, not Potash Starvation, Cause Blackened Boiled Potatoes

SEEKING THE REASON why some boiled potatoes blacken and others do not, investigators have observed unusual enzyme activity in the discoloring potatoes. New experiments have confirmed this factor as a cause of blackening. It reveals itself in a relatively high content of free amino-acid nitrogen, presumably caused either by relative enrichment in lower



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polypeptides or by low stability of the protein in the discoloring potatoes.

It had also been suggested that potassium starvation might be a cause. By analogy with the effects of potassium deficiency in other plants this seemed plausible, but experimental evidence rules otherwise. Adding potassium chloride did not tone down the excess enzyme activity, as it should if potassium starvation were the cause.

The protein of discoloring potatoes differs slightly from that of color-stable potatoes, chiefly in having a higher tyrosine content. In agreement with this observation, discoloring potatoes give a higher tyrosine equivalent when autolyzed than do color-stable potatoes. Again, discoloring potatoes show no appreciable increase in their yield of alpha-amino acid nitrogen when autolyzed. A normal potato releases more than 25 per cent of its protein or peptide nitrogen in the alpha-amino acid form under the same conditions.

Digest from "Proteolytic Activity in Relation to the Blackening of Potatoes After Cooking," by A. F. Ross and W. E. Tottingham, *Journal of Agricultural Research* 57, 433, 1938.

Sugarless Beverages

LIQUEURS FOR DIABETICS, or for any diet in which sugar is contra-indicated, are sweetened with a synthetic sweetening agent. As the preparation of the sweetened beverages is described in German-Austrian Patent 154,363 (granted Sept. 26, 1938, to Geza Mansfeld of Pecs, Hungary) an aqueous pectin solution is mixed with alcohol to form a gel. This gel is thoroughly shaken, until it is converted to a colloidal sol, and saccharin or other synthetic sweetening agent is added. From this point any of the customary ingredients for making liqueurs may be used for making up the final beverage, with any desired aroma. The absence of sugar makes the drinks safe in sugar-free diets, yet palatability is not sacrificed. (Saccharin is prohibited by food laws in the United States.—Ed.)

New Trick in Rapid Moisture Determination

MANY EFFORTS have been made to step up analytical procedures in keeping with the modern high speed production tempo. Several expedients have been tried for speeding up moisture determinations. They all come back to the idea that slow heat-transfer to the sample is the bottle neck, holding back the flow of routine analyses. Acting on this suggestion, and adding the thought that slow heat transfer *from* the sample after it leaves the drying oven is not helpful, a new double trick has been introduced.

The trick is simple. Two thick metal plates are provided, one for heating the sample quickly to drying temperature without much change in the temperature of the plate itself, and one for cooling the dried sample quickly to weighing temperature. The metal must have high heat conductivity, for quick transfer, and high heat-capacity so that the plate is not cooled much in heating the sample. Aluminum is the answer.

The aluminum moisture dish, without its cover but with the sample spread over its bottom, is placed on the hot aluminum plate. Drying takes only fifteen minutes, or twenty for coarsely ground materials. Cooling takes only about 2.5 minutes, or a little more in hot weather or with some types of moisture dish.

Digest from "Rapid Determination of Moisture," by R. M. Sandstedt, *Cereal Chemistry* 15, 813, 1938.

Sugar Refining Costs

(*Continued from page 195*)

refine our own sugars at $0.68. Or, if we don't want to be a refiner on top of all our other jobs, we can buy from the sugar refiner at $0.566 and save ourselves over $0.11 and get much better quality material. Who said we wanted to be a refiner! Of course, all are not in a position to buy liquid sugars locally, but there are always cheap grades of sugar on the market, at least $0.20 under granulated, and the larger liquid sugar plants are spreading over the land.

It is interesting to know that many patents for the bleaching of sugar solutions by chlorine have been granted since 1852, and that it was recommended as far back as 1820. The disclosures in these patents and in the literature make it very difficult to think up original variations and this is very clearly emphasized if we look at the records of the U. S. Patent Office in connection with Patent 1,989,156. There it is disclosed that this patent was only issued after personal appearance with assurances, samples, and affidavits to prove that the claims of the patent did not apply to raw sugar and that the proposed process could not be used effectively on raw sugar. Now we find that this very patent is the basis of a method to refine raw sugar.

To claim that no improvements are possible in sugar refining would be to deny the inevitable. However, the possible savings on the operation of a very large new unit would not be great enough to warrant the scrapping of the present plants—especially in these unsettled times. But an advantage can be had from the construction of smaller-sized units which are carefully planned to operate with no unnecessary overhead and every advantage possible being taken of nearby distribution of the refined product with as large a proportion of liquid sugar as possible to save the economic loss in using bags. This set up will eliminate the cost of maintaining consignment stocks and most selling and service expenses. Rail freight rates on raw sugar and on refined are the same, but some locations can obtain raws from foreign ports by water cheaper than via seaboard refinery and reshipment to an inland point.

The plant previously mentioned as under construction in Milwaukee has been designed by the writer to take advantage of important improvements which have been worked out, together with all the savings from local distribution of the product. For the present, the plant will make only liquid products. In this plant, it will be possible to melt raw sugars or washed sugars and decolorize by high speed flow through bone char. This method allows of higher purification by more complete segregation of impurities in the exhausted char than is practiced today. And the subsequent washing out of the easily removed portion is followed by the final reactivation by heat in the presence of air at controlled temperature. This method differs from that generally used, as it does not build up carbon in the interior of the bone char granules, with consequent gradual weakening of the activity of the char.

This plant will take advantage of the high decolorization and colloid removal attainable through the use of phosphate of lime. The clarifying equipment will be an improved type of Williamson clarifier. Proper elimination of colloids has a marked effect on the clarity of the final products and even persists in its value to the substance in which the product finds its final use. This new refinery is a "one man" plant, as it will be so arranged as to simplify the supervision and coordinate departments to such degree that labor costs will be very low. There will be no units which could be considered expensive nor short-lived, depreciation and overhead will be very low. Power and fuel are reduced appreciably from the requirements of other standard outfits.

The out-turn of the plant will depend on the grade of sugars melted, but is rated at about 100,000 lb. per day.

BOOKS RECEIVED

EQUIPMENT STANDARDS. Parts I and II. Formulated by Refrigerating Machinery Association, Southern Bldg., Washington, D. C., 1938. 27 pages; 8½x11 in.; paper. Price, 50 cents.

The value of this booklet to food engineers lies in the fact that it presents desirable industrial practice which will be a helpful guide to purchasers of refrigerating machinery.

Standards are given in Part I for amonia compressors, condensers, valves, liquid receivers and mains and for brine coolers, steel and wrought iron pipe and cold storage room insulation. In Part II are covered low-pressure condensing units (accessories recommended for base units), Freon-12 condensers (terminal difference) and Freon-12 water coolers (mean temperature difference).

THE AMERICAN WOMAN'S COOK BOOK. Edited by Ruth Berolzheimer. Published for Culinary Arts Institute by Consolidated Book Publishers, Inc., 537 S. Dearborn St., Chicago, Ill., 815 pages; 5¾x8¼ in.; cloth. Price, $2.50.

As the title indicates, this book was prepared for the housewife. So it is full of recipes for things people like to eat. Which makes it a useful tool for those in the food industries who need ideas on which to develop new products or improve old ones. And who in the industry doesn't? Incidentally, household recipes often can be converted to commercial formulas by changing the quantities of the ingredients and converting the kitchen technic to plant practice.

TRADE ASSOCIATIONS IN LAW AND BUSINESS. By Benjamin S. Kirsh. Published by Central Book Co., 245 Broadway, New York, N. Y., 1938. 399 pages; 6x9 in.; cloth. Price, $5.

In view of the monopoly investigating activities of the government, this volume is particularly timely. The book discusses the strengths and weaknesses of trade associations and points out in what respects the activities of these organizations are beneficial, and in what respects hostile, to public welfare. It describes how judicial findings have limited the concerted activities of trade associations, which makes it useful to trade associations executives and business men in indicating the limits of permissible or prohibited group policies and practices.

THE GERMAN FAT PLAN AND ITS ECONOMIC SETTING. By Karl Brandt. Published by Food Research Institute, Stanford University, Calif., 344 pages; 6¼x9 in.; cloth. Price, $3.

Those with a yen to study in detail the operation and effects of government control of a branch of the food industry will find in this book a lot of solid material. Germany has gone farther into the control of agriculture and of the commerce in animal and vegetable fats and oils than perhaps any other country. And this book shows how the control measures evolved, how they are working and where they are heading. By way of background, the author discusses the whole economy of fats and oils in Germany prior to the new regime.

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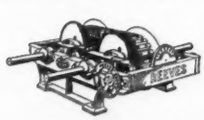
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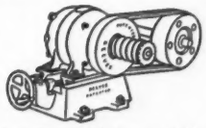
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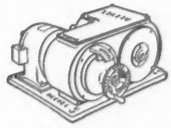
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PATENTS

Grains and Seeds Freed From Fungus Growth, Spores, Spore Cells, Insects and Their Eggs, Larvae, Nits, and Infested Grains by Agitation in a Flotation Cell in the Presence of a Froth-Forming Reagent—Theodore Earls, Pacific Palisades, Calif. No. 2,143,306. Jan. 10, 1939.

Lactic Acid Produced by Fermenting Converted Starch Liquor With Lactobacillus delbruckii in Presence of a Non-Denatured Milk—James F. Walsh and Haskell C. Needle, Chicago, Ill., to American Maize Products Co. No. 2,143,358. Jan. 10, 1939.

White Calcium Lactate Made by Fermenting Converted Starch Solution With a Lactobacillus in Presence of Calcium Carbonate and Non-Denatured Milk—Raymond E. Daly, James F. Walsh and Haskell C. Needle, Chicago, Ill., to American Maize Products Co. No. 2,143,359. Jan. 10, 1939.

Lactic Acid and Lactates Produced by Fermentation of Converted Starch Mass with a Lactic Acid Bacillus in Presence of a Protein Nutrient From Distillers' Grains—Haskell C. Needle, Chicago, Ill., to American Maize Products Co., No. 2,143,360. Jan. 10, 1939.

Sodium Lactate in Purified Stable Form Made From Impure Sodium Lactate by Treatment With Sodium Sulphide Followed by Oxidation and Crystallization to Remove Excess Sodium Sulphide and Resulting Sodium Sulphate—Willard L. Morgan, Calumet City, Ill., and Abraham H. Goodman, Hammond, Ind., to American Maize Products Co., No. 2,143,361. Jan. 10, 1939.

Sodium Lactate in Colorless and Odorless State Made by Reaction Between Concentrated Lactic Acid and an Excess of Concentrated Sodium Hydroxide Followed by Bleaching With Vegetable Carbon—James F. Walsh, Chicago, Ill., to American Maize Products Co. No. 2,143,362. Jan. 10, 1939.

Crackers and Biscuits Baked Upon a Continuous Traveling Band Hearth—Fred G. Salerno, Chicago, Ill. No. 2,143,525. Jan. 10, 1939.

Raw Beet Juice Mixed with Unrefined Precipitate From First Step Carbonation Preliminary to Heating at 80–95 Deg. C. for Reduction in Frothing in First Carbonation and to Reduce Refining Cost—Earl R. Cowan, Grand Forks, N. Dak. No. 2,143,594. Jan. 10, 1939.

Apricot Juice Added to Orange Juice as a Flavor Preservative During Canning—Peter Bias, San Francisco, Calif. No. 2,143,642. Jan. 10, 1939.

Emulsified Food Spread Made to Contain Approximately 78.4 Per Cent Water, 7.9 Per Cent Fat, 13.2 Per Cent Salt and 0.5 Per Cent of Tragon and Tragacanth as Stabilizers for the Resulting Emulsion—Arthur K. Fisher, La Grange, and Lawrence F. Culkin, Chicago, Ill. No. 2,143,651. Jan. 10, 1939.

Dried Prunes Softened by Immersion in Water at Not Higher Than 212 Deg. F., Freed From Excess Surface Moisture, and Subjected to Water Vapor Under Pressure at a Temperature Higher Than 212 Deg. F.—Paul C. Wilbur, San Jose, Calif. No. 2,143,903. Jan. 17, 1939.

Yeast Raised Doughnuts and Crullers Pass Through Proofing Chamber Super Structure to Deep Fat Cooking Vat—Carl George Ellis, Kokomo, Ind. No. 2,144,182. Jan. 17, 1939.

Fruit Freed From Excess Moisture and Dried During Passage on Conveyor Having a Rocking Motion for Agitation of Load—George A. Wuest, Hood River, Ore. No. 2,144,281. Jan. 17, 1939.

Starch Dried in a Continuous Manner by Passing Through a Compartment Under Reduced Pressure Equipped With Horizontal Drying Surfaces From Which the Starch Falls From Higher to Lower Levels Counter to Super Heated Vapors—Carl Hagen, Park Ridge, Ill., to Corn Products Refining Co., New York, N. Y. No. 2,144,333. Jan. 17, 1939.

Canned Condensed Milk Rapidly Rotated on Traveling Conveyor While Passing Through Heat Treating Chambers—Alex R. Kennedy, to Indiana Condensed Milk Co., Indianapolis, Ind. No. 2,144,334. Jan. 17, 1939.

Dusting Powder for Doughnuts, Pies, Cakes and Other Pastries Comprised of 35 to 25 Parts of Vegetable Stearine, 55 to 73 Parts of Incompletely Hydrogenated Vegetable Oil With Melting Point of 94 to 110 Deg. F. and From 10 to 2 Parts of Oleo Oil With Melting Point of Approximately 94 Deg. F.—Carroll L. Griffith and Lloyd A. Hall to Griffith Laboratories, Inc., Chicago, Ill. No. 2,144,371. Jan. 17, 1939.

Pastry Dough Sheeted, Scored Into Plurality of Interconnected Polygonal Units, and Baked in a Continuous Manner—William Douglas Gibson, to Gibson Made Products, Inc., Los Angeles, Calif. No. 2,144,720. Jan. 24, 1939.

Sliced Bread Buttered by Passing Between Pair of Greasing Rolls—Walter King, to Langendorf United Bakeries, Inc., San Francisco, Calif. No. 2,144,924. Jan. 24, 1939.

Koji Made by Growing Aspergillus Oryzae Upon a Mixture of Rice and Yeast Solids, Extracting With Dilute HCL, Neutralizing to Slightly Acid Reaction, Concentrating and Grinding to Powder Form—Matajiro Kawata, Den-en Chofu, Omori-ku, to Kabushiki Kaisha Wakamoto Hompo Eiyo To Ikuji No Kai, Tokyo, Japan. No. 2,144,983. Jan. 24, 1939.

Flour Treated by Passing Between Surfaces of Heated Drum Rollers—William S. Miller, South Bend, Ind. No. 2,144,988. Jan. 24, 1939.

Pectin in Granular Form Coated to Inhibit Solution or Swelling and Incorporated in Dough to be Made Into Breakfast Cereal Foods—Clarence G. Spalding, Milford, Conn., one-half to George R. Gould, New Haven, Conn. No. 2,145,016. Jan. 24, 1939.

Beet Pulp Added to Tomato Pulp to Give a Tomato Catsup With Desired Viscosity Without Loss of Flavor Through Prolonged Concentration or Evaporation by Cooking—Charles R. Cooper, San Francisco, Calif., one-half to Augusta S. Cooper, San Francisco, Calif. No. 2,145,108. Jan. 24, 1939.

Lactose Separated From Casein or Cheese Whey in Continuous Manner—Auguste De Lisle, to Associated Dairy Products Co., Glendale, Ariz. No. 2,145,109. Jan. 24, 1939.

Foods Protected Against Change in Taste During Ultra-Violet Radiation by Refrigeration During Irradiation—Orrick Howard Biggs, Beverly, Mass. to Hygrade Sylvania Corp., Salem, Mass. No. 2,145,196. Jan. 24, 1939.

Containers for Beverages and Other Liquid Foods Evacuated by Suction Preliminary to Filling—John Mills, to Crown Can Company, Philadelphia, Pa. No. 2,145,268. Jan. 31, 1939.

Frozen Foods Given a Protective Ice Glaze in Plurality of Layers One of Which is Porous to Give Whiteness to Coating—Winfield D. Hergert, to San Juan Fishing and Packing Co., Seattle, Wash. No. 2,145,393. Jan. 31, 1939.

Coffee Concentrate Made by Circulating a Gaseous Medium in a Closed Sealed Circuit Made up of a Series of Vessels Connected by Conduit—Frank J. Horvath, Cleveland, Ohio. No. 2,145,395. Jan. 31, 1939.

Confectionery Molded on Conveyor Carrying Fragile Molds and Capable of Being Driven at a Varying Rate of Speed—Lewis K. Llewellyn, Evanston, and Albert R. Barton, Oak Park, Ill., to E. J. Brach & Sons, Chicago, Ill. No. 2,145,399. Jan. 31, 1939.

Meat-Curing Salt Composed of an Alkali Metal Nitrite Coated With Sodium Chloride and Containing a Small Quantity of a Buffer Salt to Maintain a pH Value Over 7.4 for Stabilizing Nitrite Content Against Conversion to Nitrous Acid—Lloyd A. Hall to Griffith Laboratories, Inc., Chicago, Ill. No. 2,145,417. Jan. 31, 1939.

Dough Mixing and Working Machine—Peter D. Motta, to Champion Machinery Co., Joliet, Ill. No. 2,145,428. Jan. 31, 1939.

Reel Type Bake Oven With Fire Box Inside Baking Chamber and a Longitudinal Baffle Closing Upper End of Firebox and Directing Products of Combustion Toward Walls of Baking Chamber—Louis D. Houlis, Cincinnati, Ohio. No. 2,145,482. Jan. 31, 1939.

Cream of High Viscosity Separated From Whole Milk—Cyrus Howard Hapgood, Nutley, N. J., to the De Laval Separator Co., New York, N. Y. No. 2,145,544. Jan. 31, 1939.

Dough Put Into Sheet Form by Passage Between Rolls Fitted With a Deflector Blade to Keep Dough From Adhering to Roll—Kenneth D. Loose, Bronxville, N. Y., to Loose-Wiles Biscuit Co., Long Island City, N. Y. No. 2,145,550. Jan. 31, 1939.

Fondant Mixture Made From Dry Alpha Anhydrous Dextrose, Small Quantity of Hydrate Dextrose, a Hydration Retarding Sugar and Enough Water to Cause Hydration of Anhydrous Dextrose Leaving Major Portion of Dextrose in Solid State—Carl S. Miner, Glencoe and Alva Thompson, Chicago, Ill., to Corn Products Refining Co., New York, N. Y. No. 2,145,662. Jan. 31, 1939.

Rennin Obtained From Animal Stomachs by Treatment With Hydrochloric Acid Solution With pH of 1.0 and Purifying Extract—Havard L. Keil and Betty K. Stout to Armour & Co., Chicago, Ill. No. 2,145,796. Jan. 31, 1939.

Refined White Sucrose Granules Coated With Invert Sugar—Reed W. Robinson, one-half to Andrew Olsen, Jr., San Francisco, Calif. No. 2,145,893. Feb. 7, 1939.

Confections Frozen in a Multi-Cavity Mold—John W. West, Maplewood, N. J., to Joe Lowe Corp., New York, N. Y. No. 2,145,906. Feb. 7, 1939.

Fruit Desulphurized by Heating in Vacuum in Contact With an Acidified Gaseous Heating Medium. Withdrawing Acid Gaseous Heating Medium and Subjecting Fruit to Further Vacuum Conditions Until Desired Sulphur Dioxide Content is Reached—Charles C. Moore, San Francisco, Calif. No. 2,146,155. Feb. 7, 1939.

Candy Creams Made to Contain Super-Saturated Solution of Commercial Dextrose, Small Quantity of Fine Needle-Like Dextrose Hydrate Crystals, and Crystalization Inhibiting Corn Syrup Which Upon Cooling Below 120 Deg. F. Causes Formation of Needle-Like Hydrate Crystals Throughout the Mass Preliminary to Deposition in Molds for Completion of Solidification of the Cream—Jesse K. Farley, Jr., Evanston, Ill. No. 2,146,178. Feb. 7, 1939.

Beer for Diabetics Made to Have an Extract Content Not in Excess of About 14 Per Cent—Max Thomas, Stassfurt, Germany. Nos. 2,146,240 and 2,146,241. Feb. 7, 1939.

Cookies and the Like Baked on an Endless Metallic Conveyor Hearth Heated by Electrical Resistance—Wilford Judson Hawkins, Claiborne, Md., to National Biscuit Co., New York, N. Y. No. 2,146,427. Feb. 7, 1939.

Oven of Endless Band Type Having Upper and Lower Runs Supplemented in Heat Holding Capacity by Second Endless Metal Band Near Load Receiving End—Wilford Judson Hawkins, Claiborne, Md., and Frederick J. Brownell, Queens Village, N. Y. to National Biscuit Co., New York, N. Y. No. 2,146,428. Feb. 7, 1939.

Oven Containing a Continuous Chamber Equipped With Intermediate Panels Dividing Chamber Into an Upper Draft Chamber and a Lower Baking Chamber—Wilford Judson Hawkins, Claiborne, Md. to National Biscuit Co., New York, N. Y. No. 2,146,429. Feb. 7, 1939.